

THE ORGANIZATION AND SUPERVISION OF VOCATIONAL EDUCATION

IN

MARYLAND COUNTY
HIGH SCHOOLS

BY

JEFFERSON D. BLACKWELL

A DISSERTATION

submitted to the Board of University Studies of the Johns Hopkins University
in conformity with the requirements for the degree of Doctor of Philosophy.

JUNE, 1929

BALTIMORE

THE TWENTIETH CENTURY PRINTING COMPANY

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PREFACE

This study has been made for the purpose of determining the organization and the type of supervision of Vocational Education best adapted to the County High Schools of Maryland. Previous to the beginning of the study, it was felt by the writer that the chief weaknesses of classroom instruction in Agricultural Education in Maryland were due to the lack of definite preparation for such instruction on the part of teachers immediately preceding the instructional period and to inefficient classroom procedure.

As a basis for this study, an attempt was made in 1925-26 by the writer, under the direction of Dr. Florence E. Bamberger, Professor of Education at Johns Hopkins University, to arrive at a satisfactory basis for evaluating the efficiency of instruction in Vocational Agriculture. A questionnaire setting up a proposed basis for evaluating agricultural instruction was submitted to State Supervisors and Professors of Agricultural Education throughout the United States and to teachers of Vocational Agriculture in Maryland.

The basis adopted for use included provision for the checking of such items as the preparation made by the teacher previous to teaching, classroom procedure, and results accomplished. The form as adopted was used by each teacher of Vocational Agriculture in Maryland as a means of making a self-analysis, which, in turn, led to more efficient instruction.

In order to ascertain the organization of teaching content best adapted to Maryland high schools, teachers of Vocational Agriculture assisted in the preparation of Chapter IV entitled "Goals, Activities Through Which They May Be Achieved, and Evidences of Their Achievement."

Grateful acknowledgment to these teachers for assisting in the preparation of and the testing out of the material as presented in Chapter IV is hereby given.

Acknowledgment is also hereby made to Dr. Florence E. Bamberger, Professor of Education, Johns Hopkins University, for directing the research and for assistance in organizing the various supervisory activities; Dr. Edward F. Buchner, Director of the College for Teachers, Johns Hopkins University; Dr. Albert S. Cook, State Superintendent of Schools, and Professor H. F. Cotterman of the University of Maryland for encouragement and inspiration; Dr. Fowler T. Brooks, Assistant Professor of Education, Johns Hopkins University, for assisting in the detailed treatment of the statistics; Miss Bessie C. Stern, Statistician, Maryland State Department of Education, and Dr. C. E. Myers, Statistician, Pennsylvania State Teachers' Association, for directing the specific handling of data.

JEFFERSON D. BLACKWELL

Baltimore, Maryland.

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* NOTE—A typewritten copy of Exhibits A, B, C, D, E, F, G, H, and I is available in the bound copy of the dissertation at The Johns Hopkins University, Baltimore, Maryland.

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CHAPTER I

JUSTIFICATION OF VOCATIONAL EDUCATION IN A SYSTEM OF EDUCATION

The Place of Vocational Education in a System of Public School Education

That vocational education is an integral part of public education is conceded by many leading educators. No phase of education has received so much attention during the past decade as has vocational education in the secondary schools of the United States. While many of the leading educators have accepted and fostered it, others have opposed it, and still others have been more or less passive in their attitude. Most of the opposition has come from persons who thought of vocational education in its narrower forms. They have felt that it had as its chief purpose the developing of manipulative skills without sufficient knowledge of the underlying scientific principles. Today most educators agree that one of the first requisites of a good citizen is the capacity for self support; that each individual is entitled to such preparation as will enable him to make the most of life's opportunities; that equal educational opportunity should be provided for all the people of the nation; and that individuals should be given the opportunity to select that training which is demanded by their respective interests and needs. These are "cardinal principles" in vocational education. The masses are now aware of the values of vocational education. They realize the necessity for the training of every youth for a successful career. The "pick up" methods used by people of past generations no longer fit the present generation to cope with existing conditions. Even the apprenticeship system, so effective during an age, not so far distant, is now proving ineffective. Schools have demonstrated the fact that the young boy and girl may be effectively trained for life work in the home, on the farm, or in the shop.

The place of vocational education in a system of education is set forth in quotations from some of the leading educators of today. Dr. R. O. Small, Director of Vocational Education for Massachusetts, in addressing the members of the Maryland Society for Vocational Education in 1924, said:

"In this educational enterprise, if we are to successfully maintain our position of a democracy, we may not stop short of including in our program, and reaching in our activities, all of the children of all the people—reaching and teaching effectively all of our youth to be cultural, civic and economic units of society.

"It will cost money to do this, but it is worth it. Let us stop thinking of our educational expenditures as so much expense. These expenditures should be thought of as investments. All we have depends upon their being adequate investments. There is a notion that we can not afford to make this investment; all of the social evidence I can secure convinces me that we can not afford *not* to make the investment. We must develop our human resources—all of these resources—if we are to continue to prosper.

"A usable education for all the children of all the people will cost more, but it is worth whatever it may cost. It is the only way by which democracy can have all of its needs adequately ministered to. In the long run it is the only way by which we can retain democracy. Are we honest in our aim and claims for our form of government? If so, let us be honest with ourselves and set ourselves squarely at the task of accomplishing our aim. At present we are dangerously far away from it.

"I propose that we train to meet all of these needs, that we make courses affording our youth such training as an integral part of our educational scheme. 'Democracy needs culture and character,' say our critics, 'and your plan gives only brawn and vulgar materialistic skill; it kills culture and makes not at all for character building.' Vocational education is not intended to supplant general education. It is not in competition with general education. It is for the group which, having acquired the working tools of an education, desires to fit itself for employment.

"A usable education is in no way inconsistent with, or destructive of, true culture and real character. With proper instructors it may become the surest medium for the discovery of the first and the development of the second. Through vocational education, I submit, we can hope to help all of our youth to become creditable units of society: economic, civic and cultural units."

Dr. C. A. Prosser, Director of Dunwoody Institute, of Minneapolis, Minnesota, has said:

"There is a crying economic need for vocational education. The two great assets of a nation which enter into the production of wealth, whether agricultural or industrial, are natural resources and human labor. The conservation and full utilization of both of these depend upon vocational training."

"The purpose of Democracy is so to organize society that each member may develop his personality primarily through activities designed for the well being of his fellow members and of society as a whole. Education in a democracy, both within and without the school, should develop in each individual the knowledge, interests, ideals, habits and powers whereby he will find his place and use that place to shape both himself and society toward even nobler ends."—*Anonymous*.

Until recent years, the high schools have been operated for the limited number who could afford the time and expense of such a training. According to the news letter for the State of Washington for April, 1925, of every one thousand boys and girls in the United States entering the first grade: 670 leave school before reaching the 8th grade; 330 complete the 8th

grade; 100 enter high school; 30 graduate from high school; 5 enter college, and but 3 graduate from college.

"A statement by the United States Commissioner of Education, 1923, says that out of every 1,000 boys entering the fifth grade in American schools 139 complete high school, and only 23 finish a college course."***

From the above figures, it appears that approximately six times as many graduate from high school as from college, hence the necessity for teaching a vocation in the high school, if at all.

A study of Maryland county high school enrollments for 1925-26* shows that 27% of the girls, and 17% of the boys entering the first grade were enrolled in the fourth year of high school. It is estimated that approximately 20% of all pupils entering the first grade in Maryland county schools later graduate from the high school. Maryland apparently has a greater responsibility toward its high school boys and girls than does the average state of the United States, since a larger per cent enter high school in Maryland than in most states.

Training all normal pupils for life is the objective presented by the Commission on Re-Organization of Secondary Education.** "Although they may be inadequate,*** some of the objectives formulated and stated some years ago by the Commission on Re-Organization of Secondary Education point in the right direction. Stated in terms of human activities**** some of the objectives are:

1. Education for health activities
2. Education in the fundamental processes
3. Education for parental and home activities
4. Education for citizenship activities
5. Education for recreational activities
6. Educational activities for developing ethical character
7. Education for insight and appreciation
8. Education for vocational activities."†

The members of the commission rightly placed health as the first of the aims, since all agree that health is essential to the mental, moral, spiritual, social, vocational, as well as to the physical development of the child. Command of fundamentals is necessary, and all important, as a basis for all types of education. The problem of how best to secure not only a command of the fundamentals, but a knowledge of how best to correlate the fundamentals with daily life has been one outgrowth of modern

* Progress in Reduction of Number of Over Age Pupils in Maryland Counties, November, 1923-1925, Maryland State Department of Education, June, 1926.

**Bulletin 35 (1918), United States Bureau of Education, Washington, D. C.

***Wheeler, J. T.: Methods in Farmer Training—Turner E. Smith Publishing Co., Atlanta, Ga.

****Bobbitt, Franklin: How to Make a Curriculum—Houghton, Mifflin Co., N. Y.

† Wheeler, J. T.: Methods of Farmer Training—Turner E. Smith Co., Atlanta, Georgia.

education. Worthy home membership as one of the cardinal principles has received an impetus through the development of vocational agriculture for the farm boy and home making for the farm girl. The boys are being taught not only the necessity for production of agricultural products on the farm, but the fact that the farm home is the basis of all social life in the rural community. Through home making the girls are being taught not only conservation of products, but what is better, to have the right attitude toward the home and community life. Both boys and girls are in this way being educated for worthy home membership.

Through the study of agriculture and home making, correlated with the regular high school subjects, boys and girls are being taught the relationship of the individual to society as a whole. With such a realization they are coming to see that all persons of a community must be trained for citizenship, to the end that right attitudes may be taken toward political questions.

The need for a system of ethics, which will aid in the solution of local, state and national moral problems, is equally as great in the rural high school as in the city high school.

The modern farmer thinks of his vocation as one which provides time for recreation. A careful study would perhaps show that, taking the calendar year as a basis for estimating, the farmer of today has equally as much time for leisure as does the average man of the town or city. How best to train for the use of such time becomes, therefore, a problem for the rural high, as well as for the city high school. By developing an appreciation for outdoor life, and for music, good literature, etc., the rural high school pupil is being trained for the use of such leisure time as may be available.

The committee on Cardinal Principles in Secondary Education very wisely included vocational efficiency as one of the objectives to be attained by the modern high school. The other objectives are perhaps equally important, since each is involved in the thorough training of a boy for his vocation. The farmer and farmer's wife of the future will need a broader outlook on life than has been necessary for success during the preceding generations. The farmer must not only be intelligent for his own preservation as an individual, but he must appreciate the obligations and responsibilities demanded by society as a whole. The farmer's wife must be prepared for, and given an opportunity to express initiative in her work. Vocational education has been organized with the idea of the well-rounded citizen in mind. It is advocated that in the instruction for both agriculture and home making, approximately one-half of the time be devoted to academic and one-half to vocational subjects. Best

results are obtained where the two phases of work are correlated as closely as is feasible.

Vocational instruction, in order to be effective, should be an integral part of the educational program of the community. Those members of the community who are especially interested in education from a vocational standpoint, as well as those who are interested primarily in general education, should realize that the objectives are, after all, very much the same. All should unite in seeking to formulate and carry out a program such as will mean the development of the best interests of the community as presented by the boys and girls. School authorities and local teachers especially should be, and are, responsible for the attitudes of the community toward the correlated program.

"And now that vocational education has become generally accepted as a function of the system of public schools, the problems of efficiently *coordinating* the several types of education for culture, civism, physical well-being, and vocational proficiency become more than ever before of acute moment.

"Between the extremes here stated is a more or less broad 'twilight zone,' in which neither custom nor present theory yet give us adequate guidance. Persons thinking in terms of non-economic values very naturally desire to claim the utmost of young people's working hours for liberal education. Persons thinking chiefly in terms of economic values, and keenly appreciative of the early approach of responsibilities for self-support and support of dependents, naturally desire the reservation of some time—a half-year to four years—for definite vocational training—either as a process, like apprenticeship, in productive work, or, through a special school, in direct preparation for 'full responsibility' productive work."*

"There has long been a controversy relative to the degree and character of separation between general education and vocational education. It seems that this is but a single phase of this total matter of the segregation of each of the ten fields of special functioning from the others. In this respect vocational education does not occupy any peculiar position because of its dealing with specialized functions. The principle applies fully to all fields.

"The problem has not yet been solved for vocational education because leaders of education have not yet come to think sufficiently in functional terms of any kind. When they come to do so, they will be in a position to relate the vocational field to the others with a degree of rationality that is not yet apparent.

"The normal living of adult life is the thing for which education is designed to prepare. Normal living is to be prepared for by living normally—according to the most fundamental principle of education. We can therefore say that this education through normal living is the most fundamental single factor in one's training for his general adult responsibilities. He is learning to do by doing, but without any consciousness of the fact that he is learning anything."**

*Snedden, David, Teachers College, New York Vocational Education Magazine, January, 1923.

**Bobbitt, Franklin, University of Chicago—Vocational Education Magazine, January, 1923.

Some feel that vocational education in the high school encourages specialization at a time when the pupil should be securing the so-called fundamentals. With proper correlation there is little danger of too early specialization. In fact, vocational instruction properly correlated has been the means of keeping many a pupil in school throughout the four years. The prospective farmer will usually remain in high school if he can be shown that by so doing he will be materially benefited in the preparation for his life work. The girl who is looking forward to the making of a home will be interested in the high school course to the extent that it prepares her for home life.

Kinds of Vocational Education Especially Adapted to the Counties of Maryland

Rural community development in Maryland as represented by the home, the church, the school and therefore the citizenship, is dependent upon the prosperity of the rural community. A survey of any rural community will show that the comforts and modern conveniences of the farm home depend almost wholly upon the prosperity of the farmer, and the vision of the farmer and his wife. That the rural church is greatly influenced by the character of the farming of the community is evident, as is also the fact that the rural school, in order to be a success, must have adequate financial support. The stability of the citizenship and the stability of the rural community, therefore, depend largely upon the prosperity of the rural people.

The agricultural development of a rural community must come through properly educating the people who live in the open country. We should substitute the motto "Stay on the Farm" for the motto "Back to the Farm." The best rural communities are made up of people who have grown up in their respective communities, provided of course such people have received the type of training adapted to their needs. It is imperative that young people be taught to recognize the advantages and opportunities of their respective communities as compared with those of the city.

Maryland is primarily a rural State. According to the 1925 census, the State has 49,001 farms, as compared with 47,908 farms in 1920, an increase of 1,093 in the number of farms in five years. Of the total number of farmers in 1925, 35,138, as compared with 32,805 in 1920 were owners. These figures show not only an interest in farming, but that the farmers were at least no less prosperous in 1925 than in 1920. During this same period the total number of farmers in the United States decreased 1.2 per cent, while the number of farms operated by owners decreased 1.4 per cent.

"The total area of Maryland is 12,210 square miles, of which 2,350 square miles are water surface. Of the total land area of 6,862,240 acres, approximately 5,057,140 acres are included in farms, while 3,354,767 acres are under cultivation."

"Maryland, with its great variety of soil and climatic conditions, offers exceptional advantages to the agriculturist. Within the borders of the state are lands admirably adapted to general farming, while the fine market and transportation facilities offer every inducement to those who wish to enter the field of specialized farming. Generally it is customary, in speaking of the different portions of the State, to refer to the Eastern Shore, Southern Maryland, Northern-Central Maryland and Western Maryland. Each of these subdivisions is a distinct agricultural region and possesses certain peculiarities of soils, surface features and climatic conditions, as well as different market and transportation facilities.

"Maryland is a land of attractive, comfortable farm homes. Nowhere in America can one find a rural landscape more pleasing than is to be found along the well-built highways of Maryland, where the natural scenic features are enhanced in their beauty by the well-ordered homes, with their artistic home grounds, indicating not only the prosperity, but also the aesthetic appreciation of her people."*

That the high schools of Maryland are at present attempting to meet the needs of the rural people is indicated by the fact that in 40 of the 148 high schools in the State, instruction in vocational education in agriculture is being given. Approximately 1,000 boys are receiving such instruction. That all farm boys enrolled in Maryland high schools are not receiving systematic instruction is, however, shown by the 1920 census. Seven thousand two hundred and forty-seven farm boys between the ages of 14 and 20 years were enrolled in high schools at that time. Some of the objectives of agricultural education are:

1. To prepare boys for efficient farming in a given region
2. To create interest in the occupation of farming
3. To meet the needs of and to improve young men in their chosen profession of farming
4. To give mature farmers such information as will make of them better farmers
5. To give dignity and create a pride in farming as a vocation

There are also departments of vocational home economics in fifteen of the high schools. Some of the objectives of home economics are:

1. To develop right attitudes toward the home
2. To prepare girls for enjoyment of home life
3. To establish higher standards for the home
4. To develop proficiency in performing the duties of the home
5. To enable the home maker to live the fullest life possible.

Since the development of rural community life is dependent upon the prosperity of the community and upon the type of edu-

*Extension Service Bulletin No. 18 (1919), University of Maryland.

cation given people who live in the open country, and since the high schools of Maryland, primarily a rural State, are not meeting the needs of even a majority of farm boys, it is evident that increased interest should be shown in preparing rural boys and girls for the lives they will live. It is to be understood, of course, that not all farm boys should prepare for farming as a vocation. One way in which the boy and girl may be better trained for rural life is through the giving of definite instruction in agriculture and home making. Consideration of how agriculture can best be taught in the rural high school is the basis for this publication.

The Cost of Vocational Education

Herbert Hoover, Secretary of Commerce and a member of the Federal Board for Vocational Education, has been quoted* as having stated that vocational education must pay for itself, otherwise it is not vocational. That instruction in vocational education in agriculture approaches that standard is evidenced by a study of the report of the Federal Board for Vocational Education for 1921-22.** The total expenditures for salaries of teachers of vocational education in agriculture was \$3,701,907.74, while the labor income for the pupils enrolled was 97% of this amount, or \$3,573,321.57. Teachers and supervisors of vocational agriculture in Mississippi*** have adopted as their slogan, "Remember the Minimum Financial Goal." By minimum financial goal is meant that "the teacher of agriculture determines that the total net profit from pupils' products shall not be less than the total cost of their agricultural instruction for the fiscal year as based on his salary."

During 1925-26 the 482 Maryland boys enrolled for all-day courses in vocational education in agriculture during 1924-25 produced an income of \$29,209.72, or an average of \$60.60 from project work, according to the Fifty-ninth Annual Report of the Maryland State Board of Education. The per pupil cost for salaries of teachers of vocational agriculture in Maryland during 1924-25 was \$62. The average per capita cost for each unit of instruction in vocational education in agriculture and home making in the secondary schools of Maryland from 1918-1924 was, however, lower than in the United States as a whole, the average per capita cost for instruction in home making being \$14.75 in Maryland as compared with \$19.47 for the United States, while the average per capita cost for instruction in vocational agriculture was \$56.71 for Maryland, as compared with \$67.69 in the United States.****

*Vocational Education Magazine for September (1924).

**Yearbook 1923, Federal Board for Vocational Education.

***Vocational Education Magazine for September (1924).

**** From an unpublished study made by the writer during 1924-25.

Professor W. H. Lancelot, of the Department of Agricultural Education at Ames, Iowa, after a survey of vocational agricultural education in Iowa says:

"All that is asked of the instructor in vocational agriculture, he can deliver—and some besides. The results which he is actually able to secure are not merely sufficient to pay his salary, but are great enough to pay it from ten to twenty times. In nearly any Iowa community, for example, an effective man can, within a period of three or four years, reduce the cost of producing pork by approximately \$1 per hundred; increase the average yield of butter-fat per cow by fifty pounds or more; diminish the cost of producing corn by at least ten per cent; or increase the production of eggs per hen by from forty to sixty. The value of these four results alone for the average Iowa community would amount to more than \$100,000. Yet there are others that would increase the total greatly."**

The members of the Federal Board for Vocational Education apparently feel that the cost of vocational education is justified. In one of the annual reports, we find the statement:

"This cost can not be regarded as constituting a serious financial burden upon the community. It is approximately the cost of a medium-sized battleship. Certain indirect costs of this form of education can not be accurately estimated, but in the aggregate they are relatively to our wealth and population insignificant. If vocational education is worth while, certainly as a Nation we can afford the price of such education. Our only concern is to know that it is worth while. If it is, expenditure on account of such education is in the nature of an investment which will yield large dividends from year to year through the progressive increase of labor, skill and industrial efficiency.

"The essential purpose of this Act (the Vocational Education Act of 1917), is to extend public school education to provide for the needs of our youth who do not enter our higher technical and professional educational institutions. We are accustomed to large expenditures for the maintenance of these higher educational institutions. In some of our State universities the cost of providing education for the professions runs well into the thousands of dollars per student graduated. Vocational training for the commoner wage-earning pursuits and skilled trades is equally as essential as is training for professions. The humblest worker, equally with the youth who proposes to enter the professions, has a right to the sort of training he needs for the occupation by which he proposes to earn his livelihood and support his family, and through which he will render his service to the community in getting the community's work done. For him the cost of vocational training is relatively small, and is in fact a cost in appearance only, since the result of his training will be increase in efficiency and economy in production during the life period of his economic productivity."*

Dean Withers of New York University in discussing the question as to the present costs of education made the following statement:

*From Seventh Annual Report, Federal Board for Vocational Education (1923).

**Vocational Education Magazine, January (1925).

"We were spending in 1920 only nine-tenths of one cent per day per child more than we were spending in 1890, if the value of the dollar of 1890 is taken as the standard. Since the attendance in the high schools of the county has increased so marvelously during the past thirty years, we were actually spending no more, but slightly less per day per child on the education of children in 1920 than we were in 1890.

"These and other figures having to do with the rapid increase of wealth and the transfer from private to public expense of a great many types of service that were taken care of privately, show that in proportion to other interests we are not spending as a people more, but much less than the new educational demands actually require that we should spend."

The question as to the method of meeting the cost of instruction in vocational education was well set forth by Dr. Albert S. Cook, State Superintendent of Schools for Maryland, in a commencement address at the University of Maryland in 1925. Superintendent Cook said:

"I am not among those who have become obsessed with the idea of Federal aid to public education; I believe that the respective States eventually, if and when they desire, can work out their own educational destinies; but when we see the wonderful progress of agriculture, of agricultural education, of vocational education and of road building through the impetus of Federal aid, we are confronted with a condition, not a theory. The State that repudiates the idea of Federal aid for public education thereby assumes the responsibility for producing the results by its own effort, by its own financial and moral support of its schools, and such assumption of responsibility is necessarily incompatible with a progressively diminishing effort on the part of that State."**

Summarizing the discussion on the place of vocational education in a system of public education, the writer submits the following:

1. A system of education that does not include vocational education is incomplete
2. While a large part of the training of youth should be of a general nature, the vocational needs should be given due consideration in the planning of a program of education
3. The period of training for the youth of a State should be extended as far as is feasible in that particular State
4. A county system of education should provide training for at least the vocations of farming and home making. The general high school education is not sufficiently broad to prepare for these vocations
5. Training in service is an important phase of vocational education
6. The passage of the Smith-Hughes Act confirms the opinion that vocational education should be supported by the public

*Vocational Education Magazine (1924).

**Bulletin for graduating exercises of the University of Maryland (June 14, 1924).

7. Even though vocational education may be comparatively expensive, it is more expensive to omit it from a program of education
8. The masses realize that vocational education should be available to every youth who can be trained "to do better the things which he will do anyway"
9. Each individual youth is entitled to such training as will enable him to make the most of life's opportunities
10. Vocational education affects particularly the economic and social life of a State and nation
11. The problems of a democracy and the problems of education are inseparable. The leading force within the State by which we may hope to direct the development of society is education
12. An education is not efficient unless it enables those possessing it to live comfortably
13. The aim of vocational education is to prepare for vocational efficiency.

Annotations to Specific References

Eaton, T. H.—*Vocational Education in Farming Occupations*—Lippincott Company, Philadelphia.

"A volume given to the consideration of the purpose, the content, and the method of vocational education in agriculture under rational organization of the public high school as an agency of education."

Hill, D. S.—*Introduction to Vocational Education*—Macmillan Company, New York.

The aim of the writer of this book "has been steadily to furnish an introduction to the study of the vocational aspects of public education."

Leake, A. H.—*The Vocational Education of Girls and Women*—Macmillan Company, New York.

This book "is intended to appeal to students in colleges and normal schools, that offer courses in household arts and other vocational courses for women, to school superintendents, principals, to directors of vocational schools, to social workers, to vocational advisers of girls and women, and to the growing number of lay readers who are beginning to study educational problems and affairs."

Snedden, David—*Vocational Education*—Macmillan Company, New York.

"This book is devoted primarily to a discussion of current problems in vocational education. Space has not been given either to historical surveys or to description of contemporary achievement."

Wheeler, John T.—*Methods in Farmer Training—Through Participation and Placement*—Turner E. Smith Company Atlanta, Georgia.

"The purpose of this book is to present in a straightforward manner the problems involved in organizing and teaching courses in agriculture that have definite vocational objectives."

U. S. Department of Interior Bulletin No. 35 (1918)—Washington, D. C.

This bulletin contains a detailed report of the N. E. A. Committee on Cardinal Principles in Secondary Education.

CHAPTER II

SOME FACTORS INVOLVED IN THE ADMINISTRATION OF A COUNTY SYSTEM OF VOCATIONAL EDUCATION

The Adaptation of Vocational Education to Existing High School Curriculums

From the preceding chapter it is apparent that vocational education is adapted to Maryland conditions. The types to be further developed in the respective counties will, of course, vary. In considering the type or types of vocational education to be given additional stress in a county, the authorities will, of course, take into consideration:

1. The need for such additional instruction. This will depend largely upon the occupations and characteristics of the people in the county. No educator will intentionally deny the farm boy and farm girl the opportunity of securing the all-round development that will best fit him or her for life's work.

Since educational policies in Maryland are determined for each county by the County Board of Education, on the recommendation of the County Superintendent of Schools, any local group feeling the need of agricultural instruction for the boys of their particular high school must therefore convince the county school authorities of the vital importance of their request.

2. The feasibility of introducing additional work into the county. In considering this factor, the authorities should be guided by the adaptability of vocational instruction, and its relation to the present system of education. The availability of the financial support necessary for the introduction and maintenance of such additional instruction may be a factor for the consideration of the counties. The fact that both Federal and State aid are available for the partial payment of all vocational teachers' salaries makes this factor one that can be met by most counties, provided there is a real need and provided the high school curriculum may be adjusted in such a way as to provide for the vocational courses.

Maryland receives from Federal funds annually for salaries \$33,863.79 for teachers of vocational education in agriculture, and \$9,683.62 for teachers of vocational home economics. At present the State is appropriating \$15,000 annually for administration, supervision and the partial payment of salaries of vocational teachers.

In order that county authorities may determine the adaptability of vocational education to their respective high schools, the following type curriculums have been set up:

TYPE CURRICULUMS IN VOCATIONAL AGRICULTURE

TWO YEAR CURRICULUM

	MINUTES PER DAY	DAYS PER WEEK	UNITS CREDIT
<i>First Year</i>			
English	45	5	1
Mathematics	45	5	1
Related Science or Biology.....	45 }	3 }	1
Science Laboratory	90 }	2 }	
Plant Husbandry, including related Farm Shop...	90*	5	1½
			Total 4½
<i>Second Year</i>			
English	45	5	1
U. S. History and Civics.....	45	5	1
Related Biology or Science.....	45 }	3 }	1
Science Laboratory	90 }	2 }	
Animal Husbandry, including related Farm Shop	90*	5	1½
			Total 4½
			Grand total 9

It is suggested that the schedule be arranged, if possible, so that the work in academic studies and science be done in the morning, and the class work in vocational agriculture or vocational home economics be given the first part of the afternoon. The students in agriculture can then be taken on a trip for the whole afternoon without interfering with the other classes of the school. When advisable students may be excused the last half of the afternoon for work on their projects.

* In addition to the ninety minutes per day given in the classroom to agriculture, provision shall be made for the equivalent of ninety minutes per day to be devoted to home project or other supervised practical work.

FOUR YEAR CURRICULUM

	MINUTES PER DAY	DAYS PER WEEK	UNITS CREDIT
<i>First Year</i>			
English	45	5	1
Mathematics	45	5	1
Related Science or Biology	45 }	3 }	1
Science Laboratory	90 }	2 }	
Plant Husbandry, including related Farm Shop...	90*	5	1½
			Total 4½
<i>Second Year</i>			
English	45	5	1
Mathematics	45	5	1
Related Biology or Science.....	45 }	3 }	1
Science Laboratory	90 }	2 }	
Animal Husbandry, including related Farm Shop	90*	5	1½
			Total 4½

	MINUTES PER DAY	DAYS PER WEEK	UNITS CREDIT
<i>First Year</i>			
English	45	5	1
U. S. History.....	45	5	1
Chemistry or Physics.....	45 }	3 }	1
Laboratory Work.....	90 }	2 }	
Agricultural Economics and Farm Management	90*	3	1
		Total	4
<i>Fourth Year</i>			
English	45	5	1
Problems of Democracy.....	45	5	1
Physics or Chemistry.....	45 }	3 }	1
Laboratory Work.....	90 }	2 }	
Farm Equipment and Community Specialties.....	90*	3	1
		Total	4
Grand Total			17

* In addition to the ninety minutes per day given in the classroom to agriculture, provision shall be made for the equivalent of ninety minutes per day to be devoted to project or other supervised practical work.

DAY UNIT COURSES IN VOCATIONAL AGRICULTURE

Unit courses may be offered in high schools adjacent to high schools having departments, the former not being in the position to establish departments of vocational education in agriculture. These units may be taught by teachers employed in regular all day departments. The subject matter to be taught may be selected from the farm enterprise outlines as found in Chapter IV.

The following are typical units which may be taught:

YEAR	UNIT	MINUTES	DAYS PER WEEK	UNITS CREDIT
1	Corn or Truck Growing.....	90*	1	$\frac{1}{4}$ **
2	Dairying or Poultry.....	90*	1	$\frac{1}{4}$ **
3	Farm Management or Farm Equipment..	90*	1	$\frac{1}{4}$ **
4	Agricultural Economics, or Community Specialties	90*	1	$\frac{1}{4}$ **
Total				1 - 2

* In addition to the 90 minutes per week devoted to classroom instruction, the equivalent of 90 minutes per week should be devoted to the project or other supervised practical work.

** If two different unit courses are each taught 90 minutes a week during any given year, $\frac{1}{2}$ unit high school credit may be allowed.

High schools located in, or adjacent to, rural communities, provide the logical place for instruction in vocational education

in both agriculture and home making. Pupils are able to come in direct contact with the everyday problems of the farmer and the farmer's wife. In this way much of the instruction has a practical application to either the farm or the farm home. The equipment and atmosphere of the farm and the farm home offer an opportunity for real laboratory work in connection with the home project, or other supervised practical work. For some types of instruction the school laboratory may be preferable to the farm or farm home. For the boy or girl who finds it necessary to travel some distance in order to reach the consolidated high school, the home project, or other supervised practice work, may be made to function almost equally as well as for the boy or girl who lives near the school, provided the teacher carries on a definite and systematic system of supervision. As is evident, the rural high school offers many advantages for vocational instruction over the separate vocational school found in several of the states, which must, because of the expense, be located at some distance from the homes of many of the boys and girls.

Needs and Interests of Pupils

The question has often arisen as to whether or not high school pupils really know what they wish to select as their life work. Just as it is true that many persons as adults fail to follow professions or vocations for which they prepared, the same condition will be found for some who complete the vocational courses in high schools. Of the girls who complete the home-making courses, little can be predicted, because of the fact that knowledge gained in the home-making course may be adapted and applied throughout life, while the attitudes developed toward life problems may "carry over" regardless of the length of time between the time when the knowledge was attained or the attitude developed and the time it is used. Sooner or later the majority of girls taking home-making courses will profit thereby. It has been estimated that 90% of all high school girls may profit by home-making courses. Of the boys completing the vocational agricultural courses, more can be determined with certainty. A study made by Dr. C. E. Myers, under the direction of the Federal Board for Vocational Education* shows that of a total of 8,340 boys who had studied vocational education in agriculture and who had left high school, 4,488 or 54% were following farming as a vocation; 5% were in related occupations; 8% attended agricultural colleges; 14% attended colleges other than agricultural colleges; 10% entered non-agricultural occupations; while 9% were unaccounted for. Dr. Myers concludes

* Federal Board for Vocational Education Bulletin 82 (1923).

that from 60 to 75 per cent of the students given vocational instruction in agriculture are now in agricultural work. With the 54% farming, 5% in related occupations, 8% in agricultural colleges, and 9% unaccounted for, we have a possible 76% for the high figure in the above estimate. On the other hand, 67% might be justified for the low figure.

In making his study, Dr. Myers gathered data by means of a questionnaire entitled: "Record of Former Students of Vocational Agriculture." Teachers of vocational education in agriculture in 722, or approximately 62% of the all-day schools giving instruction in vocational agriculture in thirty-five states answered the questionnaire from data secured first hand and from interviews. From a study of the "Extent to Which Ex-High Students Who Have Not Studied Agriculture Engage in Farming," Dr. Myers found some interesting facts. Reports were received from 271 typical rural high schools in New York, representing over 2,350 high school graduates who had not, and 910 who had, studied vocational agriculture. Of the former group, 3.6%, and of the latter group, 45.2%, were farming. From a similar study made in Pennsylvania, corresponding results were obtained. Dr. Myers concludes that "The vocational classes in agriculture in the state of New York are sending twelve times as large a proportion of their students directly into farming as do the academic high schools," and that "Vocational education in agriculture in rural high schools is not only a great selective agency, but it is also a great directive agency, sending young men into farming early in life. The gain in vocational efficiency due to an early start in an occupation such as agriculture is very evident."

Although like information is not available for all Maryland county high schools, a similar study was made by H. R. Shoemaker, Teacher of Vocational Education in Agriculture at Middletown, Frederick County, Maryland. Mr. Shoemaker found that of the forty-four farm boys who had either graduated after taking courses in agriculture or had had two or more years of agricultural work, thirty-two were either living on farms or attending agricultural college; eight were in occupations other than farming; and four were in colleges other than agricultural colleges. As is evident, the percentage either on farms or in agricultural colleges was 72.7.—See Seventh Annual Report of the Middletown Department of Agriculture (1926).

One phase of vocational education that should receive more attention is part-time instruction for the boy and girl who can not devote the entire time to school. Provision is usually made for spending the mornings on the farm or in the farm home, and the afternoons at school. The school work may consist entirely

of instruction in some specific phase of vocational education or may include vocational instruction and subject matter related to the vocation. In this manner the school is correlated directly with the farm, or farm home work. A program that offers vocational and related instruction without developing the manipulative skills is unsound. In part-time instruction, boys who have entered the vocation of farming are able to advance rapidly in that vocation because of their ability to apply the knowledge gained to actual situations.

Another type of instruction especially adapted to the vocations of agriculture and home making is evening class instruction. Such instruction is organized and given especially for adult farmers and farmers' wives. The instruction given may deal with specific phases of the farm or the farm home, or be of a general nature. Such instruction may be made very effective by correlating it with the actual problems of the members of the group. The coming together, as a group, for the specific purpose of learning how to do better their chosen work will prove helpful and stimulating to the community. There is really no reason why adults should not profit by evening class instruction, provided such instruction is given in the spirit of helpfulness.

That vocational education in agriculture may be organized in such a way as to meet the needs and interests of rural boys is evidenced by a statement made by Honorable Homer Hancock, State Commissioner of Agriculture for Tennessee. Mr. Hancock says:

"Vocational agricultural training is now filling a long-felt need, in that it is giving boys and girls in the rural sections intelligent and systematic training in their life work and at the same time allowing them to eat at home and sleep under their parents' roof at night. In communities where this work is well under way I find a wonderfully well developed cooperative spirit among the grown-ups as well as among the younger set.

"By close observation I have discovered that boys receiving vocational instruction in agriculture, vigorously conducting projects on their fathers' farms and in a great many instances sharing the profits or losses from live stock or crops, are much more interested in solving farm problems and in making country life more attractive than those not receiving this training. By making inquiry of farmers whose sons are receiving the training, I have found that they are in the great majority of cases strong in their praise of the work, besides admitting that they, too, are greatly benefited."*

* Vocational Education Magazine (1925).

PER CENT OF THE 1925 GRADUATES OF MARYLAND COUNTY
HIGH SCHOOLS WHO TOOK UP EITHER FARMING
OR HOME-MAKING IN 1926.

County	TOTAL NO. OF HIGH SCHOOL GRADUATES		BOYS ENGAGED IN AGRICULTURE		GIRLS ENGAGED IN HOME-MAKING	
	Boys	Girls	No.	Per Cent	No.	Per Cent
Allegany	103	174	.....	.....	20	11.5
Anne Arundel	34	68	1	2.9	17	25.0
Baltimore	89	155	5	5.6	19	12.3
Calvert	13	19	5	38.4	4	21.0
Caroline	42	61	2	4.8	6	9.8
Carroll	47	118	4	8.5	20	16.9
Cecil	33	58	2	6.1	19	32.8
Charles	6	15	1	16.7	3	20.0
Dorchester	24	49	.....	.....	10	20.4
Frederick	81	147	10	12.4	35	23.8
Garrett	24	36	1	4.2	9	25.0
Harford	50	64	6	12.0	14	21.9
Howard	7	23	2	28.6	6	26.7
Kent	22	27	5	22.8	8	29.6
Montgomery	30	80	7	23.3	14	17.4
Prince George's	36	83	8	22.2	17	20.5
Queen Anne's	35	48	5	14.3	11	22.9
St. Mary's	6	.....	.....	.....	.....	.....
Somerset	27	48	.....	.....	7	14.6
Talbot	31	49	6	19.4	15	30.6
Washington	102	136	1	1.0	31	22.8
Wicomico	46	70	5	10.9	13	18.5
Worcester	34	75	1	2.9	11	14.6
Totals.....	922	1,603	77	8.4	309	19.3

* Excerpts from the Annual Report of the Maryland State Department of Education for 1926.

Status and Qualifications of Vocational Teachers

The effectiveness of vocational instruction will depend very largely upon the ability, training and experience of the teacher. Real ability will be needed in adapting the instruction to the pupil and to the community. A vocational teacher in a rural high school must have a sympathetic understanding of rural conditions, and possess a genuine spirit of service and high ethical principles. Such a teacher must know how to secure the maximum efficiency with the minimum amount of effort. The right attitude toward the teaching profession is essential, as is also the ability to realize the possibilities of and to demonstrate a cooperative spirit. The general qualifications include such characteristics as definite purpose, professional spirit, faith in self and others, ability to inspire, tact, courtesy, power to evaluate problems, foresight, vision, judgment, promptness, stability, self control, optimism and enthusiasm.

The past experience should be such as will give a first hand knowledge of the vocation in which the instruction is to be given. The agricultural teacher, in order to be most successful, should have had actual experience on the farm. The home-making teacher, on the other hand, should have had actual experience in the home. Merely living on a farm, or in a home, is not to be construed as being equivalent to actual experience. The training of the teacher of vocational agriculture should include, not only college instruction in technical agriculture, but also a knowledge of such educational and related subjects as will enable him to instruct effectively. He should "possess such qualities of leadership as will command the respect of the successful practical farmers of the community." In like manner, the home-making teacher should possess, in addition to college instruction in technical home economics subjects, a knowledge of such educational and related subjects as will enable her to win the esteem and respect of all persons involved.

In order to provide for project supervision during the summer months, all teachers are employed on a twelve-month basis. The longer school year, together with the fact that 12 of the 27 white teachers provide transportation between two different schools, the distance ranging from 4 to 18 miles, and all provide transportation while supervising projects, accounts for the difference in salaries between academic and vocational teachers. Four of the teachers are principals, which raises the average salary. Tenure and length of teaching experience are also factors influencing salaries paid vocational teachers. The comparatively long tenure of agricultural teachers in Maryland is an indication of the need for, and the esteem in which agricultural teachers are held by the different communities.

TENURE AND EXPERIENCE		SALARIES OF MARYLAND AGRICULTURAL TEACHERS.	
<i>Years of Experience</i>	<i>No. of Teachers</i>	<i>Salary</i>	<i>No. of Teachers</i>
1	4		
2	7	\$1,800	4
3	3**	1,900	4
4	6†	2,000	5
5	1*	2,100	4***
6	1*	2,150	2
8	1**	2,200	4****
9	1	2,300	1
10	2	2,400	1***
18	1	2,800	2
Average 4.3	Total 27	Average \$2,088	Total 27

* Includes a teacher having 2 years' experience in a State other than Maryland.

† Includes a teacher having 3 years' experience in a State other than Maryland.

** Includes a teacher who taught in 2 different Maryland schools.

*** Includes combination principal and teacher of vocational agriculture.

**** Includes 2 men who act both as principals and teachers of vocational agriculture.

In the State Plan for Vocational Education submitted by the State Board of Education to the Federal Board, the following qualifications of teachers are "set up" as conditions for the approval of departments of vocational agriculture:

- (1) The teacher of vocational agriculture shall have been reared on a farm or shall have had at least two years' farm experience after reaching the fourteenth birthday
- (2) He shall have graduated from a four years' college course in agriculture, and shall have completed 200 recitation hours in education, including courses in agricultural education equivalent to those given by the University of Maryland, or pursue such courses while in service during the ensuing year
- (3) He shall be in sympathy with farm life and know rural conditions and customs
- (4) He shall possess qualities of leadership and be able to command the respect of the successful practical farmers of the community, and to assist in the solution of the practical problems of the neighboring farms as these problems from time to time arise.

Similar qualifications must be met by all teachers of vocational home economics.

The Value of an Annual Plan of Work

A teacher with the ability, experience and training as proposed herein may fail in a community unless he or she is able to make the necessary adaptations. An annual program of work, prepared and approved before the opening of the school year and followed rather closely during the year, may be the means of making the results attained most effective. The annual program of work for the vocational teacher is valuable in that it:

1. Enables the teacher to work in a businesslike manner—all successful business men have definite annual programs of work
2. Enables the teacher to get a vision of work for the whole year, thus preventing the omission of essentials
3. Provides a definite schedule for each phase of work, enabling the teacher to teach on a seasonable sequence basis
4. Enables teacher to stress different phases of work, according to relative importance
5. Sets up goals for accomplishments, without which the teaching may be haphazard
6. Helps the teacher to attain vocational aims and objectives
7. Guarantees cooperation of patrons, through activities of advisory committee
8. Attracts attention to the individual teacher as being efficient and business-like
9. Makes possible careful selection and organization of subject matter from a job analysis standpoint

10. Enables teacher to use most effective method of presentation—methods should vary with individuals and with groups
11. Provides for correlation of vocational with academic studies, which is necessary if the vocational work is to function in the community.

Content of an Annual Program of Work

The content of an annual program of work will vary with the community and with the individual teacher, but should be based on the needs of the community as determined through a community survey and upon the advice of the advisory committee appointed by the county or local superintendent, upon the recommendation of the local teacher. A job analysis will also aid in determining the needs of the group. The teacher's judgment is more important, when he or she is experienced and is acquainted with the particular community. A study of individual judgments of successful representatives of vocational education is essential, because of the wider experience of State supervisors and teacher-trainers. Parents, pupils and colleagues, may be interviewed in order to obtain specific reactions to the proposed program. An inventory of the interests of pupils enrolled for vocational courses should be taken into consideration in preparing the course of study. The program of work should include among other things:

1. The teacher's weekly schedule of classes
2. An outline of subject matter, based on job analysis, seasonal sequence and needs of the group to be instructed
3. Provisions for classroom instruction—the number of periods to be devoted to recitation, laboratory, etc.
4. Provisions for the supervision of project work
5. School activities, carried on in the community
6. Professional improvement—a definite plan for reading, study, attendance at conferences and summer sessions should be made and followed conscientiously. There is no good reason for a teacher's crystallizing.

School activities carried on in the community by the vocational teacher tend to correlate the home and school work, develop school spirit, motivate subject matter in school, and give needed publicity. The public needs to be kept informed as to aims, problems and achievements in vocational education. It should be convinced that vocational education is an integral part of a well rounded education for boys and girls. Publicity is also needed in order to justify the expenditure of funds for vocational education, without which little may be accomplished. Out-of-school activities offer opportunity for selling vocational education. The teacher must not only have a product worth selling, but must know how to sell it.

Uses to Be Made of Annual Program

1. One copy should be submitted to the State Supervisor, one to the County Superintendent, and one to the local teacher
2. The program may to advantage be followed rather closely by the teacher
3. It should be revised from year to year
4. It may be used as one measure of accomplishments, at close of year.

There is much need for measuring results in vocational education. Vocational education is not completely accepted by the public, even though millions of dollars are annually spent for the work. Vocational education is still in the experimental stage. We have in the past had no definite method of measuring results, but standardized tests of many phases of the work are now available.

Scientific Tests in Vocational Education Now Available

Dr. C. E. Myers, of Harrisburg, Pennsylvania, is editor of the National Information Tests on Animal Husbandry, Dairy, Farm Crops, Farm Mechanics, Forestry, Fruit, Poultry, and Vegetable Gardening.

An analysis of dressmaking has been prepared by Miss Van Horn of Mechanics Institute, Rochester, New York. The type jobs in dressmaking have been analyzed and common operations listed. Miss Emma Conley, State Specialist in Vocational Education for Girls, New York, states that in order to measure the value of a clothing course, it would seem that several different types of tests and scales must be used, including the information test, the performance test (the testing of skill, speed and general ability), the appreciation test, and a test showing thinking and reasoning ability. Miss Conley and a group of teachers representing nine teacher-training institutions in New York State have worked on a basis for evaluating methods, courses and teachers.

A new analytic sewing scale is described by Dr. Murdock in the Teachers College Record, Columbia University, for November, 1922. The Murdock Sewing Scale is used to test hand sewing. It may be purchased through the Bureau of Publications of Teachers College, Columbia University, New York City. A University of Chicago group has worked on machine sewing scales which test machine sewing. A book entitled: "Home Economics in American Schools" may be purchased from the University of Chicago Press, Chicago, Illinois, at \$1.25. Information tests prepared by a group of graduate students at Teachers College, under the direction of Miss Anne M. Cooley may be purchased through the Bureau of Publications, Teachers College, New York

City, at twenty-five cents for three copies. A Foods and Cookery Information test has been organized by Miss Brown of the University of Minnesota, and Miss Conley of New York State. The following articles on Home Economics tests may be read to advantage: "What Can Educational Measurements do for Home Economics?"—by Miss Clara M. Brown, *Journal of Home Economics*, April, 1924; "Construction and Use of Information Tests in Home Economics"—by Miss Clara M. Brown, *Journal of Home Economics*, May, 1924; "Some Results of Tests in Home Economics"—*Vocational Education Magazine*, June, 1924.

SUMMARY OF THE VALUE OF AN ANNUAL PROGRAM OF WORK

1. An annual program of work is worthwhile, even if discarded as soon as completed
2. No vocational teacher can hope to accomplish a maximum amount of work without a definite program of work
3. An annual program of work should include among other things provisions for:
 - a. Basing work on existing community needs
 - b. Instructing pupils enrolled to best advantage possible
 - c. Supervision of related home work, as well as classroom instruction
 - d. School activities carried on in the community
 - e. Professional improvement
 - f. A satisfactory basis for evaluating instruction.

CHAPTER III

THE PROGRAM OF THE AGRICULTURAL TEACHER

The Teacher at Work

In the preceding chapters an effort has been made to show the place of vocational education in a system of public education, and the adaptation of such education to the high schools of Maryland. The remainder of this publication will be devoted to the work of the teacher of vocational education in agriculture. Much of the work advocated herein has actually been carried on in Maryland high schools under the direction of the writer. An attempt has been made to include only such material as will be of real assistance to teachers of vocational education in agriculture. It is assumed that the county school authorities have, after analyzing their respective local situations, in the light of Chapters I and II, concluded that a department of vocational education in agriculture should be established and that a study of the local community has been made in order to determine such points as:

1. The need for vocational agricultural education. Evidence that a group of boys sufficiently large to justify the establishment of the department is now available, and that in all probability similar groups will continue to be available for some years
2. The adaptability of agricultural education to the high school curriculum
3. The attitude of the local school authorities and patrons.

The teacher, meeting the qualifications as set up in Chapter II, has been employed and has reported for duty. Assuming that the teacher employed is not familiar with conditions in the local community, his first work will be to become acquainted. This he may do in such ways as:

1. Through personal visitation and observation
2. By attendance at community meetings
3. By making regional census and farm management surveys
4. By making a farm enterprise survey.

The first two ways listed are self-explanatory. Regional, census and farm management surveys may be conducted as part of the class work in Farm Management and Farm Economics.

The Farm Enterprise Survey

No method of studying the agricultural conditions of the local community has been more successful than has the farm enterprise survey. During 1925-26 farm enterprise surveys were made under the direction of the writer in each of the Maryland communities having departments of vocational education in Agriculture, as a basis for each teacher's preparation of a long time program of work. The following blank and discussion on the systematic farm enterprise survey by Professor H. F. Cotterman, of the University of Maryland, was used in making the survey.

The systematic farm enterprise survey is used by teachers to procure data which cannot be procured by casual observation or by other means. In such a survey the teacher attempts to procure accurate information regarding the range of farming enterprises in his community and something of their relative economic importance.

As a preliminary in conducting such a survey it is necessary to prepare a set of survey blanks which may be used by the teacher or a member of his class in the tabulation of the information from a single farm. Blanks which have been used for this purpose follow. With blanks such as these in his hand, a day class pupil should have no difficulty in procuring the information desired not only for his home farm, but also for the farms of two or three of his neighbors with whom he is well acquainted. By means of this simple device a class of twenty pupils can readily procure returns from sixty or more farms, which number can serve as a representative sampling for the community. This task, too, can readily be made to function as a preliminary exercise in the pupil's choice of product.

In preparing survey blanks and in asking for the data for which such blanks call, great care should be exercised to avoid antagonizing the persons whom the teacher and his pupils interview. Parents even are particular about the material which their sons gather on their home farms for school purposes. From the beginning a teacher must remember that none of this information belongs to his department as a right, but that its procurement is purely a matter of cooperation on the part of the people of the community. One good test in all such matters is the asking for no material which the teacher himself would not want to give were he in the same situation, or to make no approach to gather data of which he could not approve were he the individual interviewed.

After the returns for the individual farms are in, the next step is to summarize and record the data on a special tabulated

sheet, which any teacher can easily devise. The compilation and summarization of these data in addition to functioning as a part of the pupil's preliminary study in the choice of a project, can readily be made to function as an opening course exercise in the fall, and to serve as the basis for the planning of the course for the year.

This survey will readily give the economic importance of the enterprises of a community for the year for which it is made. It will not, however, give any indication of the enterprises which seem to be growing less profitable or those which bid fair to become more profitable. By continuing it for successive years, some idea may be gathered of changes in the community. Those enterprises which remain profitable over a series of years can be expected, other things being equal, to continue profitable.

The profitable enterprises of the community are enterprises for which training should be offered in day classes. They are the enterprises which must receive the bulk of the attention and which must serve as basis for study. Enterprises which seem to be on the wane in the community should not receive as much attention as enterprises which bid fair to become profitable. But before a teacher shifts emphasis from old enterprises to new enterprises, he must check his judgment and be sure that such a change is desirable. He should consult his county agent and all other agencies which seem in a position to furnish information concerning the possible future work of the community. A number of unexcusable mistakes have been made by teachers in regard to the enterprises which they have taught in certain communities simply because they did not check their findings and judgments with the findings and judgments of others.

COMMUNITY SURVEY OF FARMING ENTERPRISES

Name of farmer..... Post Office.....
 County..... State..... Number of acres in home farm.....
 Number of acres rented..... Acres of tillable land.....
 Acres of untillable land..... Acres in orchard.....
 Acres in truck..... Acres in home gardens.....
 Acres in woodland..... Permanent pasture..... Total acres
 operated

FARM ANIMALS

KIND OF ANIMAL	TOTAL NUMBER	BREED	NUMBER REGIS- TERED	NUMBER PURE BRED	*GRADE	SCRUB	REMARKS
Male							
Dairy							
Female							
**Dairy Young Stock							
Mature Beef Cattle							
**Young Beef Stock							
Mature Horses							
**Colts							
Hogs { Fattening							
Breeding							
Pigs							
Chick- { Over 5							
ens { Mos.							
Under 5							
Mos.							
Sheep { Mature							
Lambs							
***Miscel- { 1.							
aneous { 2.							
3.							
4.							
5.							

* One parent a purebred.

*** Horses and cattle under 2 years of age are classified as colts and young stock, respectively. Swine under 3 months as pigs. Sheep under 5 months as lambs.

** Turkeys, geese, ducks, etc.

FARM CROPS

KIND OF CROP	TOTAL ACREAGE FOR PAST YEAR	TOTAL YIELD IN TONS, BUS., LBS.	YIELD PER ACRE	AMOUNT OF CROPS SOLD IN TONS, BUS. OR LBS.	PRESENT ACREAGE IN GROWING CROPS
*Hay					
1. _____					
2. _____					
3. _____					
Permanent Pasture					
Temporary Pasture					
1. _____					
2. _____					
Corn					
1. Silage					
2. Field					
3. Sweet					
Wheat					
1. _____					
2. _____					
**Fruits					
1. _____					
2. _____					
3. _____					
Truck Crops					
1. _____					
2. _____					
3. _____					
Miscellaneous					
1. _____					
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					

* In all cases, state kinds of hay, permanent pasture, temporary pasture, corn, etc.

** Indicate the fruits by number of trees.

Data gathered by _____ Date _____

As a result of this survey, it has been concluded that a long time program for the teacher of all-day agricultural groups should include—

First Year—Plant Enterprises

Second Year—Farm Animal Enterprises

Third Year—Agricultural Economics and Farm Management Enterprises

Fourth Year—Community Specialties and Farm Equipment Enterprises

Detailed teaching outlines for these enterprises will be found in Chapter IV, pages 69 to 172.

The Program of Work for a Given Year

With the results of the farm enterprise survey, a consensus of the opinions of the different members of the local advisory committee on agricultural instruction*, and the local school authorities, and with the knowledge gained from personal observation available, the local teacher should, during the summer months, prepare his program of work for the following year and submit it for approval to the local advisory committee on agricultural instruction, the county superintendent of schools and the State supervisor of agricultural education. As previously indicated herein, the program should include:

1. A teacher's weekly schedule of classes
2. The teaching content for the all-day groups, organized on a seasonal sequence, and job analysis basis
3. Proposed methods of classroom instruction for all-day group classes
4. Provisions for organizing and conducting part-time and evening classes
5. Provisions for supervised field instruction
6. School activities carried on in the community.

The Teacher's Weekly Schedule of Classes

The teacher's weekly schedule of classes will vary with the individual teacher. Each group is expected to meet for two consecutive periods, or the equivalent of 90 minutes each school day during the week. A total of 450 minutes each week during the school year should be devoted to agricultural instruction. The amount of time necessary for the supervised practice work will

* A committee of from three to seven local farmers, to be appointed by the county superintendent of schools upon the recommendation of the local high school principal and teacher of vocational education in agriculture.

depend largely upon the enrollment and the needs of the boys enrolled. It is expected that each boy enrolled will give the equivalent of 90 minutes daily throughout the year to supervised practical work. Much of this work will be done during the summer months. The teacher is expected to devote his entire time during the summer months to supervised practical work. The following is given as an example of a schedule adapted to a typical rural high school.

TEACHER'S WEEKLY SCHEDULE

PERIOD	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9 to 10.30 A. M.	Agr. 1 & 2	Agr. 1 & 2	Agr. 1 & 2	Agr. 1 & 2	Agr. 1 & 2
10.30 to 12 M.	Agr. 3 & 4	Agr. 3 & 4	Agr. 3 & 4	Agr. 3 & 4	Agr. 3 & 4
12 to 1 P. M.	Noon	Noon	Noon	Noon	Noon
1.30 to 3.30 P. M.	Part-time Group	Part-time Group	Part-time Group	Part-time Group	Part-time Group
7.30 to 9.30 P. M.	Evening Class	Evening Class	Evening Class	Evening Class	Evening Class

While this schedule may appear too heavy for the average teacher, it should be noted that the part-time and evening classes will be conducted during only the winter season.

In schools having large enrollments it may not be feasible to combine groups one and two and three and four, as is indicated. In such schools the teacher may be unable to include both the part-time and evening class instruction.

The Organization of the Teaching Content

No phase of the agricultural teacher's program of work is as important as is the organization of the teaching content. Dr. T. H. Eaton, of Cornell University, in his books entitled "Education and Vocations" and "Vocational Education in Farming Occupations," sets up the following criteria for the selection of teaching content:

1. *Significance*—situations meaning most to student and society
2. *Probability*—situations most likely to be met
3. *Type*—situations which have probably "transfer value"
4. *Frequency*—activities that may be made habitual
5. *Crucial significance*—situations not typical or frequent, but which must be met if they do arise
6. *Methods that have proved of superior merit and which are in use by the best farmers*
7. *Interest*—situations that appeal to learner
8. *Teaching opportunity*—as offered by season and location
9. *Subjects involving a physical or moral risk are to be avoided*
10. *Capacity*—learners' ability

These different points enumerated by Dr. Eaton are supported by the following extracts from his book, "Vocational Education in Farming Occupations."

"For determination of content in the vocational course in agriculture the first requirement is a clear conception of the purpose of that course."

"The content of our course is determined by criteria derivative of (1) demands of vocation, (2) educative environment, (3) the characteristics of the learner."

"Skills in actual control of plants and animals, social abilities in dealing with persons for the purchase, production, and sale of farm products, are themselves controlled by organized systems of subjective meanings, technical knowledge. What to do, how to do it, when to do it, why to do it, are matters of knowing and thinking."

"Experiment station data become truths or not truths not by virtue of the findings of the experiment station, but by virtue of the fact that they prove economically worth while or not, when put to the test of practice by farmers in the various regions."

"Regional differences must come in to determine more specifically the aims of teaching than can any study of the norm of the vocational group."

"It is not possible to give in one region having a characteristic type of farming vocations, training strictly appropriate even to like vocations that are characterized by conditions of a distinctly different region."

"The specific and specific-type activities which the teacher shall select for the content of his course must be determined by the opportunity for effective teaching in the locality."

"Seasonal opportunity is a factor in determining just what we shall teach as well as our sequence in teaching."

"Of the factors in determination of content, type, frequency, ultimate certainty, evolutionary values, are of importance to both the administrator and the teacher . . ."

"The final content of any course can never be determined until the teacher is face to face with his class, day after day checking and re-checking his judgments as his knowledge of them grows."

"Selection in terms of the interest of the pupil, rather than in terms of values instrumental to productive efficiency must be allowed and even encouraged up to a point at which they interfere with the acquirement of proficiency."

"Certain men find a true calling in farming because it engages all their energies in earning; others because it satisfies economic needs

and brings them into friendly relations with living creatures; others because it is good work under the open sky; others because it opens to them participation in the progress of civilization; others because it reveals biological, chemical, geologic, mechanic principles."

"Because certain situations are representative in the lives of the great majority, are frequent in their lives, or certain to be met by them, we find a common ground of experience in those particulars for all pupils."

"Curricula are not by scientific methods founded upon standards of compensation and balance, but rather upon examination of the type, frequency, and certainty of situations likely to arise in the life of the individual for whom the curriculum is a means to education."

"Because a larger amount of time and effort is spent by the normal individual in the pursuit of his vocation than in the care of his body, the enjoyment of the aesthetic, the conduct of civic duties, etc., is no reason at all that the major share of his learning time shall be devoted to the acquirement of vocational proficiencies and insights."

"Much of the farmer's consumption is directly related to his activities of production. The capital that he employs in buildings, machinery, livestock, seeds, fertilizers, etc., is consumed in the process of production."

"Because he is normally an independent householder and a dweller in relative isolation, the farmer's needs for practical knowledge of the laws of sanitation in the matter of home cleanliness, ventilation, sewage and garbage disposal, water supply and the like is greater than that of the city dweller. If his house is clean, sanitary, well ventilated, free from odors, germs and flies, it is because his household has kept it so of its own will and not because of the orders of an inspector of health or buildings."

The following brief outline* of yearly teaching plan for Farm Animal Enterprises, prepared and used during 1926-27 by Donald Watkins, teacher of vocational agriculture at Gaithersburg and Damascus, Montgomery County, Maryland, is given as an example of the method of organizing teaching content on a seasonal sequence and job basis. The number of periods to be devoted to each topic or farm job will depend upon the needs of the community.

* A detailed outline of the teaching content for farm animal enterprises will be found in Chapter IV.

Enterprise	JOBS	Mo.	DOUBLE PERIODS DEVOTED TO DIFFERENT METHODS OF INSTRUCTION.				TOTAL PERIODS	
			R	O	S	L		
Dairy								
	Importance of dairy enterprise.....	S	1		1		71	
	Choosing the breed.....	S	2					
	Selecting breeding stock.....	S	3					
	Equipment and housing.....	O	2	1				
	Grading up herd.....	Ja	2					
	Care at calving time.....	M	1					
	Summer feedings.....	Jn	1					
	Care of growing stock.....	N	2					
	Dairy pasture.....	Jn	2					
	Winter feeding.....	F	7					
	Producing clean milk.....	F	2	1				
	Certified and accredited herds.....	A	2					
	Marketing dairy products.....	A	9					
	Testing milk and cream.....	D	1			3		
	Keeping records.....	D	4					
	Registering.....	N	2					
	Diseases.....	Ja	2					
	Showing dairy cattle.....	O	1					
	Judging cattle.....	O	2			6		
	Cow testing associations.....	May	4					
	Breeding cattle.....	Ja	4					
	Bull associations.....	May	2		1			
Swine								
	Deciding upon the business.....	O	1	1				18
	Choosing the breed.....	O	1					
	Housing and equipment.....	D	2	1				
	Selecting breeding stock.....	N	2					
	Care at farrowing time.....	M	1					
	Registration.....	N	1					
	Care and feeding of breeding stock.....	Ja	2					
	Parasites and diseases.....	F	2					
	Marketing.....	F	2					
	Exhibiting.....	O	2					
Poultry								
	The poultry business.....	O	2	1			18	
	Choosing a breed and variety.....	O	2					
	Establishing a flock.....	O	1					
	Records and accounts.....	N	1					
	Houses and equipment.....	N	2	1				
	Care of breeding stock.....	F	1					
	Hatching chicks.....	M	2	1				
	Brooding chicks.....	M	2	1				
	Feeding growing chicks.....	A	1					
	Caponizing.....	J	1			1		
	Culling the flock.....	S	1					
	Feeding for eggs.....	N	3			2		

Enterprise	JOBS	Mo.	DOUBLE PERIODS DEVOTED TO DIFFERENT METHODS OF INSTRUCTION.				TOTAL PERIODS
			R	O	S	L	
Poultry—Continued							
	Grading eggs.....	N				2	
	Preventing diseases and pest.....	D	2				
	Marketing eggs.....	N	1				
	Marketing poultry.....	N	1				
	Fattening poultry for market.....	N	1				
	Exhibiting birds.....	O	2				
							35
Horses							
	Selecting a horse—breeds, etc.....	M	1				
	Feeding work horse.....	F	1				
	Care of mare and foal.....	M	1				
	Horse, barn and equipment.....	M	1				
							4
Sheep							
	Deciding upon sheep business.....	A	1				
	Breeds.....	A	1				
	Houses and equipment.....	My	1				
	Care and feed of.....	My	1				
	Breeding.....	My	1				
							5
Beef Cattle							
	Choosing a breed.....	M	1				
	Selecting breeding stock.....	M	1				
	Barns and equipment.....	O	1				
	Feeding and care.....	A	1				
	Marketing.....	J	1				
	Baby beef.....	My	1				
	Showing.....	Jn	1				
							7
Correlated Farm							
	Shop.....	As needed					
	Rope work.....						
	Soldering.....						
	Machinery repairs.....						
	Concrete.....						
	Wood work.....						
							20
Project Study							
	Jobs will vary for each project, approximately two days per month.....						20
							180

The following horizontal layout of farm animal enterprises, prepared and used during 1926-27 by O. T. Graser, Teacher of Vocational Education in Agriculture at Oakland, Garrett County, Maryland, is indicative of a method to be used in organizing teaching content in such a way as to be easily followed.

	September	October	November	December	January	February	March	April	May	June July August
Dairy Cattle	Scoring of Dairy Cow Judging Dairy Cattle Selection of Dairy Cattle	Testing for Butterfat Types and Breeds Care and Management of Dairy Cattle	Dairy Records Balanced Rations Breeds Care and Management of Dairy Cattle	Balanced Rations Types and Breeds Care and Management of Dairy Cattle	Common of Dairy Cattle Silos Dairy Barns	Aliments Cattle and Barns	Raising Calves and Heifers Production and Handling of Clean Milk	Raising Dairy Calves and Heifers Production and Handling of Clean Milk	Super- vision of all projects	Super- vision of all projects
Poultry	Culling for Egg Production Selection and Care of Winter Pullets Records	Feeding for Egg Production Types and Breeds Insects and Diseases Poultry Houses Killing and Marketing	Feeding for Egg Production Types and Breeds Insects and Diseases Poultry Houses Killing and Marketing	Types and Breeds Insects and Diseases Poultry Houses Killing and Marketing	Selection of Breeding Stock Care of Hatching Eggs Incubation and Brooding	Selection of Breeding Stock Care of Hatching Eggs Incubation and Brooding	Rearing Young Chicks Housing Caponing and Caponizing	Rearing Young Chicks Housing Caponing and Caponizing	Super- vision of all projects	Super- vision of all projects
Sheep	Selection of Breeding Stock Breeding Judging	Selection of Breeding Stock Breeding Judging	Types and Breeds Sheep Barns Care and Management Balanced Rations	Types and Breeds Sheep Barns Care and Management Balanced Rations	Care at Lambing Time Lambing Time Management	Care at Lambing Time Lambing Time Management	Castration and Docking Shearing and Care of Wool	Castration and Docking Shearing and Care of Wool	Super- vision of all projects	Super- vision of all projects
Hogs	Care of Brood Sow and Litter Butchering and Care	Selection and Breeding Butchering and Care	Selection and Breeding Butchering and Care	Types and Breeds Housing Care and Management of Pork	Types and Breeds Housing Care and Management of Pork	Types and Breeds Housing Care and Management of Pork	Castration Feeds and Pastures	Castration Feeds and Pastures	Super- vision of all projects	Super- vision of all projects
Horses			Care and Management	Types and Breeds Management	Types and Breeds Management	Types and Breeds Management	Feeding and Care of Work Horses	Care of Brood Mare	Super- vision of all projects	Super- vision of all projects
Beef Cattle	Selection and Care of Feeder Steers	Selection and Care of Feeder Steers	Types and Breeds Balanced Rations	Types and Breeds Balanced Rations	Types and Breeds Balanced Rations	Types and Breeds Balanced Rations	Raising Beef Calves	Raising Beef Calves	Super- vision of all projects	Super- vision of all projects

Instruction for All-Day Groups

Since much of the instruction in vocational education in agriculture is given in places other than the classroom, it is necessary to distinguish between classroom and field instruction. By classroom instruction is meant such instruction as is given at the school. It includes the different types of recitation and most laboratory work. Field instruction, on the other hand, includes the different types of supervised practical work and some field trips. Before considering the methods especially adapted to classroom instruction for any specific group, it will be well to get a clear conception as to the meaning of the term "method." Dr. T. H. Eaton in his book "Vocational Education in Farming Occupations" sets forth "certain major criteria for guidance in method." Dr. Eaton discusses the different factors involved in method under a number of different headings, as follows:

1. "*Activity*.—Modern educators judge of the success of teachers by the activity of their pupils. . . . The judge of method not only observes carefully what pupils do, but attempts to check up unobservable activity by means of its effects, that is by test and measurement.

"But activity, per se, can never be a fair measure of the worth of the teacher as stimulator. That activity must be directed to the ends set up by the teacher as worth while—that is to the acquirement of subject matter in accord with the selected content . . . If every boy is busy at the occupation appropriate to the objects of teaching at that time, the observed activity is a good index of the teacher's success in method.

2. "*Satisfaction*.—If activity on the part of the pupil is to be fully effective in the making of desired changes in him, then that activity must be accompanied by some degree of satisfaction; the degree of satisfaction being quite as important as the intensity or frequency of action.

3. "*Inherent Motive*.—Positive motive is of two sorts, inherent and derivative . . . The instincts of curiosity and manipulation are so strong that we rarely have to force beginners in shop work. They like to do it. Nor is it true that boys do not like to think, to use their minds. Intellectual activity is instinctively satisfying. The boy's mind is seldom vacant. It appears so, only because he is thinking not as we would have him think. Thus, if the teacher gets the boy to act as he would have him act, because the boy likes to do the thing for its own sake, he has gained a powerful motive to the accomplishment of his ends.

4. "*Derived Motive*.—We cannot, in any full measure, rely on motives inherent in activities themselves. Vocational activities are normally means to ends, not ends in themselves, for the worker . . . Work is undertaken for the sake of the results that come from it. Work is what we prepare for in vocational education. Work is the chief means by which, always, we must educate to work.

"The teacher of agriculture is dependent upon derived motive in his teaching. To secure derived motive he must suggest to the mind of the boy a purpose, a definite purpose which calls for just those activities which the teacher deems needful to his own purposes of education. That is, the boy must undertake of his own initiative the work which the teacher would have him do.

5. "*Initiative*.—Good method is further measured by the extent to which it is causal of initiative on the part of pupils . . . The good farmer, because so often and so largely thrown on his own resources, must have a considerable measure of initiative.

6. "*Weighing of Values*.—A large part of the success of the farmer consists in ability to select the appropriate in terms of its value for the accomplishment of a given end.

7. "*Organization*.—Good method will stimulate learning activities in which organization plays a manifestly important part."

Applying the preceding quotations to the problem of methods for the all-day pupil as compared with the part-time or evening class member, it is apparent that the members of the two groups are very different, especially from the standpoint of activity, derived motive, initiative, and weighing of values.

Important factors involved in efficient classroom instruction are:

1. The pupils to be instructed
2. Physical equipment of the room
3. Previous preparation of teaching content by the teacher
4. The type of instruction
5. The use made of the teaching period.

The Pupils to be Instructed

There are great differences in pupils, even in a given high school, and especially in different high schools. The results of the Thorndike-McCall Reading Scale, Form 4, given to all pupils enrolled for the study Farm Crop Enterprises in Maryland high schools showed a difference of 84 points in the reading quotient of pupils of a given high school and 109 points in the pupils enrolled for such enterprises in the State. While Mr. J. H. Hinds in his comparison* of the intelligence of boys enrolled for vocational instruction and boys enrolled for academic subjects in Texas high schools found only a slight difference in intelligence, he did find a wide variation in boys enrolled in a given high school and in the different high schools throughout the State. Individual difference of pupils will, therefore, need to be taken into consideration in preparing for and giving classroom instruction.

"To the extent that his pupils differ as regards abilities, aptitudes, vocational experiences, and personal performances, the teacher is dealing with individuals, and not with groups. To this extent he must consider the individual needs of each pupil as a part of a social group. Only in so far as the individuals of the group have had similar experiences may group instruction be adapted."**

* Vocational Education Magazine (November, 1923).

** Berry, J. B.—"Teaching Agriculture"—World Book Company, New York.

Physical Equipment of the Room

Much of the success of any period devoted to class room instruction will depend upon the physical equipment of the classroom. It is necessary that equipment adapted to the needs of the pupil and the type of instruction be provided. The references, consisting of books, bulletins, maps, and charts, must be such as will enable the pupils to attain the desired objective within the minimum of time. They must be in available form—the books arranged in cases or shelves according to subjects, the bulletins classified and placed in boxes or compartments, and the maps and charts arranged attractively. If a demonstration or a laboratory type of instruction is to be given, the equipment and materials must have been provided. The tables and chairs must not only be adapted to agricultural instruction but should be arranged in such a way as to place the pupils convenient to the teacher's desk and at the same time allow for freedom. Tables arranged in a U shape about the teacher's desk have been found very satisfactory where the proper amount and distribution of light may be provided satisfactorily. The temperature, ventilation, and cleanliness of the room must be such as will be conducive to best results. While the teacher may not be directly responsible for some of the conditions listed herein, he is indirectly responsible. See Chapter IV pages 76-171 and index for lists of equipment.

Previous Preparation of Teaching Content by the Teacher

The teacher is responsible not only for a teaching content outline for the year, but is responsible for the detailed preparation from week to week and day to day. In getting ready for actual instruction, the teacher should prepare the unit of subject matter as a whole, instead of selecting the content in a haphazard fashion. This will prevent overlapping, and will therefore prove most effective.

The Type of Instruction

The type of instruction to be used for any given part of the teaching content of vocational agriculture should be determined only after definite goals have been set up. Any given part of teaching content must be considered in its relation to the subject as a whole. Just what appreciations, attitudes, skills, habits, knowledge and abilities are involved, and how this particular part of the teaching content may be taught so as to assist in the development of a part or all of the desired goals, is a problem for analysis by the teacher, before any lesson plan can be set up.

Since the leading authorities disagree slightly as to the methods of planning for classroom instruction, it has been de-

cided that the methods advocated by different authorities should be included herein. The local teacher may adapt any or all of these different methods to his particular needs. No one best method is as yet available. Mr. J. B. Berry,* in discussing this topic states,

"Teaching is both a science and an art. As an art, it is easily analyzed into operations, or steps, each of which requires special tools, or methods. The use of one method does not constitute teaching any more than the use of one tool constitutes farming. Teaching, like farming, is a complex process, and, also, like farming, it has definite objectives.

"The so-called 'informal method' of teaching is informal only in so far as the steps are not labeled 'steps.' If one were to select from the formal steps the methods which may be related directly to the project, he would have a formal procedure which might be designated the 'project method' of teaching. The methods adopted would be: (1) farm study to introduce the problem, (2) project study and associated methods to present the new knowledge, (3) project plans and associated methods to determine the completeness of the learning process, and (4) the project activities to test the pupil's ability to think purposefully. In this statement the purposes of the four formal steps have been retained but no reference is made to 'steps' as such."

Mr. Berry summarizes:

"STEPS AND METHODS OF THE TEACHING ACTIVITY"

TEACHING STEPS	METHODS
<i>Step 1. Preparation</i> Preparing the pupil's mind for the reception of new knowledge	1. Suggestive questioning 2. Suggestive illustration 3. Informal questioning 4. Establishing the "hitching post"
<i>Step 2. Presentation</i> Presenting the new knowledge and guiding the pupil's study in the formation of the desired lines of association	1. Demonstration 2. Illustration 3. Supervised study 4. Project study 5. Survey 6. Observation 7. Lecture (telling) 8. Experiment
<i>Step 3. Application</i> Guiding the pupil in the application of the new knowledge in order to find 'weak places' in the learning process	1. Doing on the job 2. Recitation 3. Discussion 4. Project plans 5. Tests and examination
<i>Step 4. Testing out</i> Testing the pupil's ability to think purposefully in the application of his knowledge in the solution of 'life' problems	1. Home project 2. Supervised farm jobs 3. Project records 4. Project report 5. Recitation (on the job) 6. Discussion (on the job)."

* Berry, J. B.,—"Teaching Agriculture"—World Book Company, New York.

Mr. Berry in writing of the Lesson Plan states:

"The lesson plan consists of an outline statement of what is to be studied, the teaching methods to be used in each step, the materials and equipment needed in each step, the place prepared for conducting each step in the learning process, and the reference materials. The lesson unit is the basis for the lesson plan, not the 'topic' used in the teaching plan, which may include one or several problems. The lesson unit involves a single cycle of reflective thought, which consists of (1) the consideration of facts, (2) the forming of a conclusion, and (3) the 'testing' of the conclusion through application to new problems."

Mr. Berry has submitted the following outline to be used in preparing a teaching plan for a lesson unit:

"LESSON PLAN

Subject Topic Date
Lesson unit

Step 1

Methods
Hitching post

Step 2

Methods
Teaching materials
Equipment
Reference material
Where conducted

Step 3

Methods
Teaching materials
Equipment
Where conducted

Step 4

Methods
Where conducted When conducted"

Dr. Charles R. Allen* gives the following outline to be used by the teacher in preparing for classroom instruction:

**"POSSIBLE METHODS FOR DIFFERENT STEPS IN THE
INSTRUCTING PROCESS BY THE LINES
OF APPROACH**

	DEVELOPMENT	INFORMATIONAL
<i>Step 1</i> Preparation Foundation	The suggestive question Demonstration Illustration Experience	The informational question Demonstration Illustration Experience
<i>Step 2</i> Presentation Putting over	Demonstration Illustration Experiment	Demonstration Illustration Lecture
<i>Step 3</i> Application Checking up	On the job Discussion Recitation Written Test Examination	On the job Recitation Written Test Examination
<i>Step 4</i> Inspection Final Test	On the job Recitation Examination	On the job Recitation Examination"

Dr. Allen* gives detailed explanation as to the different steps involved in preparing for instruction.

Mr. A. P. Williams, in setting up guiding principles in "Methods of Teaching as applied to Vocational Education in Agriculture,"** submits the following outline, as description of teaching a lesson in order to assist in developing *operative* ability:

"LESSON PLAN

Enterprise: Growing corn for grain

Farm Job: Testing seed for germination and root rot by the "rag-doll" method

Objective: Operative ability.

Preparation:

The teaching base.....

Methods.—Discussion and use of blackboard.

Presentation:

Methods.—Demonstrations.....

Supervision of practice:

Methods.—Have pupils work in two groups, each group to prepare a "doll" holding samples from 100 ears, using copies of the analysis*** of content as a work sheet. Have each pupil read part of the test about a week later.

Testing:

Methods.—Test seed corn for projects or use on home farms

Time Allotment: Two double periods in all, not including operation of germinator by different pupils while corn is sprouting

First day—Demonstration, study, and practice of making "dolls"

Second day, about a week later—Demonstration, study, and practice of reading test."

* Allen—"The Instructor, the Man and the Job"—Lippincott Co.

** Bulletin 103, Federal Board for Vocational Education (1925).

"ANALYSIS OF OPERATIVE TRAINING CONTENT"***

JOB: TESTING SEED CORN FOR GERMINATION AND ROOT ROT BY "RAG DOLL" METHOD

OPERATIONS	STANDARD PRACTICE	RELATED INFORMATION
1. Provide equipment and materials	Germinator. Strips of cloth 12 inches wide. Glazed paper 12 inches wide (70 - pound Pearl Water Finish). Facilities for heating water and for sprinkling. Rigid shelves to hold the desired amount of corn. Knife with stout blade to remove kernels. Thermometer.	Nature of bacteria and habits of growth and relation to practice. Effect of lime on sawdust. Effectiveness of various forms of heat available which might be substituted for electric light bulbs.
2. Make "rag-dolls"	Place paper on table and cover with moistened cloth. Remove 7 kernels from different parts and sides of the ear and place in vertical row on cloth, germs up. Number rows on cloth by tens with wax pencil. Place ears on rack and give corresponding numbers. After placing a convenient number of grains (30-100 ears) roll moderately tight and label with number of ears, date and owner, first and last numbers, holding with rubber bands.	
3. Operate germinator	Soak "dolls" in water at 80°-90° F. and place in vertical position in germinator. Water "dolls" twice daily with water at 90°; also keep sawdust moist. Maintain temperature of 85°-88° in germinator, using thermometer. Provide for overflow of water pan.	Changes which take place in a germinating seed and their relation to practice.
4. Read results	Take out of germinator when sprouts appear, from between rolls of "doll." Unroll doll on smooth surface, cutting open each kernel, and observe whether germ is healthy. Discard all ears failing to germinate four strong grains and all ears in which blackened germs were found."	Indications of satisfactory germination. Indications of presence of root rot.

Mr. Williams submits the following outline as a description teaching a lesson in order to assist in developing *managerial* ability:

"LESSON PLAN.

Enterprise: Growing corn for grain

Farm Job: Buying seed

Objective: Managerial ability

Preparation:

The teaching base—

Methods.—Discussion

Presentation:

Methods—Questions to develop important decisions and factors

Supervised study of references

Demonstration of making decisions

Supervision of practice:

Methods—Summary of decisions made or conclusions reached, including facts used in the application of each factor

Testing:

Methods—Make plans for buying seed corn for project and home farm

Time Allotment: Three days.

"ANALYSIS OF MANAGERIAL TRAINING CONTENT
JOB: BUYING SEED CORN

DECISIONS	FACTORS	INFORMATION NEEDED TO APPLY FACTORS
1. What variety to grow	Yield	Varieties commonly grown by successful farmers
	Adaptation	Climatic requirements of variety
	Use	Market demand for seed corn
	Cost	Estimated cost on basis of probable availability.
2. From what source to get the seed	Yield	Average yield of seed stock
	Cost	Comparative cost of seed from different sources
	Adaptation	Similarity of climatic conditions on home farm to those on farm where seed was grown.
	Maturity	Indications of maturity.
3. When to buy	Germination	Comparative germination of seed from different sources.
	Seeding date.....	Range of planting period for locality.
	Price fluctuation..	Market supply, forecast based on seasonal price variation.
	Storage	Storage facilities needed and available.

DECISIONS	FACTORS	INFORMATION NEEDED TO APPLY FACTORS
4. How much to buy	Acreage Rate of planting... Germination Reserve supply....	Prospective acreage. Amount of seed per acre for variety chosen, for method planting and for use to be made of the crop. Allowance made for reduced germination. Estimate of amount to carry over to insure seed for another year, if crop should fail.
5. Where to buy	Reliability of dealer Net cost of seed... Source of his seed... Germination Freedom from disease.	Experience with seedhouses and seed associations. Comparison of prices of different dealers. Transportation costs. Catalogue descriptions, statements or guarantees."

Professor G. A. Schmidt* advocates the teaching of vocational education in agriculture through the use of a teaching layout of a job.

"TEACHING LAYOUT OF A JOB ENTERPRISE—POULTRY PRODUCTION

(Three days in May)

Job:

Caponizing

Situations to be dealt with:

1. There is a good demand for capons
2. Little caponizing is done
3. What caponizing is done is not done properly

Objectives:

1. To get boys to see advantages of caponizing
2. To develop ability to caponize
3. To get boys to understand every step in the operation
4. To get boys to see how to care for birds before and after the operation

Devices:

I. Demonstration:

1. Teacher to caponize two birds before class
2. Teacher to give clear explanation of steps involved

* Schmidt, G. A.—"New Methods in Teaching Vocational Agriculture"—The Century Co., New York.

- II. Laboratory exercise or field trip
Each boy to caponize one or two birds
- III. Questions for study and classroom discussion
 - 1. What is best age at which to caponize?
 - 2. What care should be given birds prior to the operation?
After the operation?
 - 3. What disinfectants could be used?
 - 4. Which would be the best and most economical?
 - 5. What is gained by caponizing?

IV. Testing:

During summer supervision, make effort to watch boys do some caponizing on their farms.

Notes:

References:"

The Use Made of the Teaching Period

From the different plans for classroom instruction included herein, one can not but conclude that preparation or purposing, presentation or planning, application or executing, and judging are the most important factors in economical classroom instruction. The teacher making adequate preparation for the classroom instruction will be convinced that not only time has been saved, but that he possesses confidence in his ability to instruct effectively.

While the type of presentation will vary with the individual teacher, and with the teaching content, there are certain forms of presentation used largely by agricultural teachers. Among the forms of presentation best adapted to the presenting of teaching content in agriculture are:

1. *The preview**—In the preview, the past experiences of the individual members of the group are drawn upon in such a way as to prepare the pupils for the reception of new knowledge.

2. *The assignment*—The assignment should grow out of the needs of either the individual members of the group, or the group as a whole, and should be presented in the form of problems for the solution of the group as a whole. Carefully planned lessons should include provisions for worth-while assignments. The assignment must be definite; merely saying, "Read the references on Breeds of Dairy Cattle" will not bring the desired results. Definite questions, placed on the blackboard, or on a sheet of paper distributed to pupils, will do much toward making the period devoted to directed study effective.

3. *Directed study*—Directed study may be made one of the most effective methods of presenting subject matter. During the period de-

* Adapted from E. Clark Fontaine's "The Method of the High School Recitation."

voted to such study, the pupils collect such data from assigned references as are needed in the solution of the problems involved. The efforts of the pupil in securing data should be guided by the teacher. Care should be taken that too much assistance is not rendered. Resourcefulness and initiative should be products of well directed study.

4. *Demonstrations*—Demonstrations may be given either by the teacher personally, or under his immediate direction. Demonstrations, in order to be most effective, must have been carefully planned with a specific purpose in view. Properly planned demonstrations may be a means of saving considerable time on the part of both pupil and teacher. There is little need for individual pupil participation in certain types of exercises.

5. *Analysis*—Analysis of such operative and managerial jobs as will give the members of the group a realization of different problems involved in the teaching content, and the method of solution for each.

6. *Laboratory*—Such laboratory work as is needed to fix certain phases of the teaching content in the minds of pupils, may well be conducted in connection with classroom work.

7. *Visual Instruction*—"There is an increasing demand for more effectiveness and more simplicity in giving information. In no subject in the curriculum are the possibilities so great for visualization of the work as in vocational education in agriculture. The teacher should make use of graphic methods and visual devices in presenting facts. There are in circulation a number of valuable charts. There is a great field of real things about the teacher which may be used in laboratory and field work. Many of these real things can be collected and used in giving instruction. A large amount of useful material is made available by use of the projector and the motion picture machine." Such material may be obtained through the Division of Agricultural Instruction, United States Department of Agriculture.

8. *Extensive reading for appreciation of rural life*.—See special bibliography.

An application of the new knowledge gained during the period devoted to directed study may be made through skillful questioning, individual reports, or through class discussion, forming a basis for the recitation. One purpose of the recitation should be the finding out of difficulties involved in the process of learning.

No one best way for conducting a recitation can be given. The type used will vary with such factors as—the pupil, the teacher, and the purpose. A maximum of pupil participation should be the objective. The testing of the individual pupil's ability to think in a purposeful manner in the application of the knowledge gained to the solution of individual problems is an important part of classroom instruction. This may be accomplished through well planned problems.

The comparative importance of purposing, planning, executing and verifying or judging* to actual teaching situations is

* Kilpatrick, W. H.—"Foundations of

Method." Macmillan Co., New York.

shown by the outlines of typical lessons taught by teachers of vocational education in agriculture, and observed by the supervisor during 1925-26.

Provision for Organizing and Conducting Part-Time and Evening Classes

As previously indicated herein, the agricultural teacher's program of work should include provisions for organizing and conducting part-time and evening classes. No other agency is better able to re-establish in the farmers, the faith in themselves that once existed, than are the agricultural teachers. The morale of young farmers, especially, must be kept on a high plane if interest in farming is to be maintained. Part-time and evening class instruction will aid materially in raising and maintaining the high morale desired. The feasibility of part-time and evening class instruction has been demonstrated by the states that have organized such instruction.

Explanation of Term "Part-Time Instruction"

According to the Federal Board for Vocational Education,*

"Part-time instruction in agriculture is designed for persons 14 years of age or over who are not regularly enrolled in school, who are either farming or preparing to farm, but *not yet* entirely on their own responsibility, and who have facilities for directed or supervised farm practice."

The purpose of evening class instruction is much the same as that of part-time instruction. The members of the group are usually older and are actually engaged in farming.

Need for Part-Time and Evening Classes

According to the Federal Board for Vocational Report for 1924, but 2,143 of the 1,200,000, or approximately one-fifth of 1 per cent, of farm boys between the ages of 14 and 21 were reached through part-time instruction, and those in 7 of the 48 states. On the basis of the 1920 census it has been estimated that there were in Maryland at that time 18,000 farm boys between 14-20. Of this number, less than 8,000 were in high school. It is evident that teachers who are responsible for giving systematic agricultural instruction are responsible for these groups. The lack of part-time and evening class instruction in Maryland has been due to the fact that teachers of agriculture have been too busy with other work. Teachers may also need special help in organizing courses. These suggestions are given herein with that need in mind.

* Federal Board for Vocational Education Bulletin No. 108, (1926.)

Steps Suggested for the Organization of Part-Time and Evening Class Instruction

A survey should be made by local teachers of vocational education in agriculture, in their respective communities, for the purpose of securing data relative to the need for, and the character of the part-time and evening class groups. The data obtained from the survey should be presented to the school administrators and agricultural organizations. Part-time and evening class groups should then be recruited by personal visits, or through the use of cards, but preferably by personal visits.

Length of Course

The length of the course and time of meeting should suit the convenience of the members of the group. Each unit of instruction should, of course, be of sufficient length to enable the instructor to cover a natural cycle of operations. A minimum of 20 meetings distributed over a period of from 5 to 10 weeks is suggested. For example: Two hours on each of two nights each week for ten weeks, or two hours on each of four nights each week for five weeks.

Deciding Upon the Units and Methods of Instruction to be Used

The prospective members of the part-time and evening class groups should be given an opportunity to indicate the unit or units of work in which they are most interested. Individual problems may form a basis for the work. The work should, however, be rather definitely planned for a series of years. Practical work on the home farm and instruction should correlate. Unit courses in agriculture—for example, poultry and dairying, should be outlined and taught on the job analysis basis. Farm arithmetic and farm shop may form a part of the courses. Instruction given for the purpose of improving the civic intelligence of the members of the groups should be organized and taught from the standpoint and needs of the members of the groups; for example, "Related Science," "Everyday English," or "Rural Betterment and Citizenship Activities," alternating. The related subjects may be taught by an academic teacher. During the course an opportunity should be given each member of the group for individual growth and development.

Some Factors Influencing the Success of Part-Time and Evening Class Instruction

1. *Definite objectives*

- a. To prepare young men for farming, on their own responsibility
- b. To improve the existing farm practices of older farmers
- c. To improve the morale of the groups.

2. *The local instructors*—The local instructors should be able to adapt the instruction to the individual members of the groups. The problem solving method is especially adapted to part-time and evening class instruction. Teachers must understand the characteristics and needs of members of the groups, and should not attempt to cover too much informational subject matter. They must have the right attitude toward life, especially rural life. The instruction should, of course, correlate with farming occupations. The instructors must visit members of the group on home farms, in order to see that the instruction being given is really what is needed. The teaching load should not be too heavy, since the teacher must have sufficient time for organizing and developing the program. The teacher's personality should be such as will readily secure the confidence of the members of the group.

3. *The place of meeting*—The place of meeting will vary with the individual community. It should, however, be readily accessible and allow for more or less freedom on the part of members of the group. An "agricultural atmosphere" is essential.

4. *Time of meeting*—The greatest success will come from courses conducted during the "dull" farming season. The frequency and length of meeting should be subject to the approval of the members of the group.

5. *The members of the group*—The success of the work will depend upon the individual members of the groups, more than any other one factor. Each member should possess, or be capable of having developed in him, the right attitude toward scientific agriculture. He must exhibit a cooperative spirit. Farming experience is a distinct advantage to the individual and an opportunity for practical application is essential. A sufficient number should be interested to guarantee that the per capita cost will not be prohibitive.

6. *The local school authorities*—The local school superintendent and the advisory committee must have faith in the undertaking and demonstrate a genuine interest in the welfare of the farmers.

7. *Units of teaching content selected and taught*—The units of subject matter taught must be such as will interest and be adapted to the individual members of the groups. The method to be used can best be determined after the characteristics of the groups have been studied carefully. Individual instruction is, however, advocated when possible.

8. *A social organization* with games, feeds, etc., as a means of promoting group activity and utilizing the group spirit may prove effective.

9. *Adjustment of the local teacher's program*

- a. By relieving him of some of the general duties now performed
- b. By readjusting his teaching schedule
- c. By adding to the present teaching load when feasible
- d. By teaching part-time classes outside of school hours.

Part time and evening class instruction may best be based on an analysis of jobs to be completed by the farmer. In preparing for this type of instruction, teachers will find the Teaching Content Outlines as given in Chapter IV helpful.

Field Instruction

The most important phases of field instruction are:

1. Field trips
2. The project or other supervised practical work.

Field Trips

In the teaching and studying of vocational education in agriculture, the teacher and pupils should look upon the farms of the community as the real laboratory, since the solution to many of the problems raised will be found on the farm. Many phases of farm crops, animals, management and economics may be taught and studied most advantageously in their natural surrounding. Field trips are to be justified to the extent that they are necessary for a working understanding of actual farm conditions. In order to make field trips most profitable, the following points should be observed:

1. There should be a definite understanding on the part of both teacher and pupils as to the purpose of the trip. An outline of the purposes may to advantage be given to the pupil by the teacher. There should always be one or more major purposes for a trip.

2. Pupils should feel a real need for such a trip. Their attention should be centered upon satisfying this felt need.

3. The teacher must have planned the trip in such a manner as to give the maximum opportunity for correlation with the problems under consideration. Definite planning on the part of the teacher may necessitate his making the trip previous to taking the class.

4. Pupils should be held responsible for individual pupil participation during the trip.

5. Pupils should be required to make a definite application of the knowledge gained during the field trip.

Note: Typical examples of field trips will be found in connection with the enterprise outlines.

The Project or Other Supervised Practical Work

Supervised farm practice is the basis for all vocational agricultural instruction. It may be in the form of either project or other supervised practical work. The term "project" in agriculture has been used, at least since the passage of the Adams Act, to designate a unit of agricultural work. In vocational education in agriculture, the term represents the practical application of the information obtained in the classroom. The classroom instruction and the project work should, therefore, correlate closely.

While the aim of a project will vary with the type of project, the following aims are typical of all projects:

1. To offer educational development to the boy through agricultural activities.
2. To offer an opportunity for the correlation of classroom and field instruction.
3. To motivate and vitalize the study of vocational education in agriculture.
4. To furnish an opportunity for a remunerative activity.
5. To develop manipulative skill and managerial ability.
6. To assist in developing a keener appreciation for and the proper attitude toward farming as a vocation.
7. To give the individual student an opportunity for the maximum development through personal participation.
8. To assist in training for farming.

Types of Projects and Other Supervised Practical Work

Projects may be of several types, namely: production, improvement, experimental, farm management and farm experience. By a production project is meant a project in which the efforts of the pupils result in material returns. The growing of several acres of corn is an example. The beautifying of the farm and home grounds is a typical improvement project, while the growing of new varieties of wheat would be an experimental or trial project. The taking of an inventory, the keeping of accounts, and the management of the home farm is a typical farm management project. By a farm experience project is meant actual work on the farm for at least one season. One project extending over a period of at least six months should be required of each pupil during each year agriculture is studied. In addition to the completion of such project, each pupil may complete a number of improvement and experimental projects, or may continue to carry on the project begun during a previous year. For example, a pupil may become so intensely interested in a poultry project the first year that he will desire to develop the project

throughout the four years. The project for a given year should, in all cases, correlate with the theory being taught that year. Where the fourth year agricultural work is taken by a student, he should have completed at least six months' supervised practical work before being allowed to graduate. This may be accomplished if a farm accounts project has been begun the previous year.

Each of the production projects should be of sufficient size to require considerable time and effort on the part of the pupil. In addition to the time spent in the class room, it is expected that each pupil will devote from 300 to 600 hours each year to actual practical work.

Projects may be either individual or group projects. Individual projects are usually conducted on the home farm, while group projects may be conducted on the school grounds. Individual projects are, however, best adapted to Maryland conditions, because:

1. Neither skill nor managerial ability, both of which are essential, can best be secured by observing the work of others
2. Actual farm conditions are well adapted to project work, due to the fact that a project carried on under such conditions will consist of a series of more or less independent units of productive work
3. The individual or home project fits in nicely with the usual farm activities of the boy
4. Pupils are enabled to carry on the project work on the home farm with very little inconvenience
5. Home project work offers an opportunity for individual achievement and personal participation.

Successive Steps in Project Work

The steps necessary for the completion of a project are:

1. Preliminary study
2. Selection
3. Plan, including preparation and study outlines
4. Execution
5. Reports
6. Supervision.

Preliminary Study

Since the project and the instruction should correlate, the preliminary project study should be limited to the study of such projects as correlate with the instruction being given. For instance, if the class is being taught farm animal enterprises, only

farm animal enterprise projects should be considered. The preliminary project should be based upon:

1. An agricultural survey of the community
2. The possibility of correlating the project with the teaching content
3. The adaptability of different projects to local conditions.

Selection

Because of the fact that there is an unlimited amount of agricultural teaching content available, and since the project work should be based upon such teaching content as is adapted to a given community, the success of the work will depend largely upon the selection of projects. The following are points which should be given due consideration in the selection and development of all projects.

1. Each pupil must complete at least one major project each year
2. The project and the subject matter being taught must correlate closely.
3. The project should fit in with the work of the home farm, and be of sufficient size to be a real farm business proposition
4. Projects should be selected as early in the year as possible
5. The project should be selected by the pupil with the approval of the parent and teacher
6. The interest of the pupil should largely determine the selection of the project
7. The full responsibility of the project should be assumed by the pupil
8. The initial cost in starting a project should be borne by the pupil. If it is necessary for a boy to secure financial assistance from his father, in order to take care of the initial expense, such financial assistance should be acknowledged according to customary business methods. This will frequently involve the giving of a note by the boy. The amount of the note and the interest thereon should be paid from the proceeds of the project.
9. Definite plans for the development of the project should be prepared by the pupil
10. In so far as is possible, the work of the project should be performed by the pupil. Such work should provide for new personal experiences and performances
11. The profit accruing from the project should go to the pupil
12. No projects should be accepted as complete until all records have been submitted.

The Plan

Because of the fact that the project should be adapted to the needs of the individual pupil there should be a definite plan for each individual. The plan should be prepared by the individual

pupil with the assistance of the teacher. Such a plan should include:

1. A definite statement of purpose
2. Proposed procedure
 - a. Project study
 - b. Initial outlay of capital
 - c. Schedule of work
 - d. Disposal of project
3. Execution
4. Records and results

The statement of purpose should enable the pupil to work with some one definite end in view. The project study should include a detailed study of the steps involved in the development of the project. A detailed outline for project study should be prepared early in the school year. Each pupil should, with the assistance of the teacher of agriculture, prepare a separate outline, which outline should correlate with his individual project. Such outline should include, among other things, a preliminary survey of the project, and detailed outline of such subject matter as is essential to the successful completion of the project. Specific book and bulletin references to each phase of the project should be indicated.

As soon as the outline is completed, each pupil should spend some time each week in studying the references. All references studied should be summarized.

In conducting project study, the teacher should take into account the individual differences and, provided each pupil has a different project, should take into account, when setting minimum standards and in assisting pupils, the individual capacities of pupils.

The following outline of project study on Sweet Corn, conducted by Mr. Donald Watkins, at Damascus, Maryland, during 1925-26, is suggestive of the way in which project study may be conducted:

I. PRELIMINARY STUDY

A. WHY A SWEET CORN PROJECT WAS SELECTED

1. Sweet corn is a profitable crop to raise
2. Sweet corn fits into the crop rotation easily
3. The harvest time for sweet corn comes when it does not interfere with other urgent farm work
4. The market and rate of pay for sweet corn is certain
5. Sweet corn is an important cash crop in this State and community
6. The production of sweet corn provides for distribution of labor
7. Sweet corn as a crop has a quick turnover

II. ESTIMATE ON PROJECT

A. LABOR ESTIMATE

1. Operations	No. Times Operations Performed	HOURS			EQUIPMENT	
		SELF	MAN	HORSE	KIND	HOURS
a. Growing						
b. Harvesting						
Totals						

B. ESTIMATE ON COST OF PRODUCTION

1. Items	QUANTITY PER ACRE	COST PER ACRE	COST PER ENTIRE CROP (2 ACRES)
a. For growing			
b. Interest on growing crop			
c. For harvesting			
Totals			

C. PROJECT SUMMARY ESTIMATE—FOR 2 ACRES

III. MAIN JOBS

A. Selecting the ground for the crop	H. Diseases and insects of the corn
B. Procuring the seed	I. Field selections of the seed corn
C. Testing the seed	J. Harvesting the corn
D. Preparing the soil for the crop	K. Marketing the corn
E. Buying fertilizer and lime	L. Cutting the fodder
F. Planting the corn	M. Keeping records and account
G. Cultivating the corn	

IV. EACH OF THE MAIN JOBS WAS ANALYZED ACCORDING TO:

A. Things to do	B. Information Needed	C. References	D. Data on Refer- ences	E. Decisions

Execution

Ordinarily, instruction, project study, and project work may be carried on to the best advantage at the same time. This, of course, is not always possible. As previously stated, each student enrolling for vocational agriculture should be required to complete at least six months' supervised practical work, before

credit for the work in vocational agriculture is given. Such work may be obtained either through supervised practical work on the farm, or through the completion of a definite project. In either event the work should be done by the individual student.

Reports and Results

Before any pupil is entitled to credit in vocational education in agriculture, he should have submitted to the teacher of that subject a report on his project. Such report should include, in addition to a summary report on his project study, an initial inventory, and statements relative to actual expenses, a labor record, receipts and profit, a final inventory, and a summarized project report.

Supervision

In order that project work may be given detailed supervision, all teachers of vocational agriculture should be employed on a twelve months' basis. During the summer months each project should be visited weekly, or as often as is necessary for the best possible supervision. The following points may be observed to advantage by teachers of vocational education in agriculture:

1. Supervision should begin with the selection of the project
2. Definite supervision should be given throughout the school year, as well as during the summer months
3. Projects should be visited as often as there is need for supervision
4. A means of transportation should be provided
5. Supervision should enable the teacher to detect weaknesses of the project and suggest remedies
6. Pupils may, to advantage, visit the projects of other members of the class
7. Project supervision should include assistance in preparing project records
8. Project supervision, as such, ends with the completion of a project. The teacher should, however, assist the pupil in making applications to other farm enterprises
9. A definite record of each project supervised should be kept by the teacher.

Evaluating Project Work

The one phase of project work which has been most neglected in the past is the matter of evaluation. Practically every other phase of school work has plans for determining results. The following basis for evaluating projects, used by the writer in supervising over 600 individual projects during the summers of 1925 and 1926, is submitted herewith:

Selection and Size of the Project—15%—All projects should correlate with the teaching content. The typical projects as set up in Chapter IV may, to advantage, be used as a basis for evaluating the project from the standpoint of size.

Type of Project—10%—All animal or seed for production projects should be pure bred; while for feeding and farm accounts projects, grade stock may be used.

Project Plan and Study—20%—The plan should include a report of the preliminary study, as well as a report on the project study as a whole.

Financial Returns—20%—Basis: Total income; returns on each hour of work on project, and returns on each dollar invested in conducting the project.

Success in Production, or Yield—20%—Measured by the average daily gain per animal and the cost of producing 100 pounds of meat; production in the case of dairy cows; and the yield per acre for field crops, or the best utilization of land planted in truck crops. The major part of the work should be performed by the pupil.

Record Book—15%—The record book should show business-like methods of recording and accounting. Neatness, completeness and accuracy should be given due consideration. The book should contain an initial and final inventory, and a detailed record of all labor, expenditures and receipts.

School Activities Carried on in the Community

While teachers of vocational education in agriculture are expected to take a definite part in the activities of the community, care should be taken to prevent too much time being devoted to such activities at the expense of regular classroom instruction. One special activity each month during the school year may be carried on to advantage, especially if the assistance of the local junior agricultural society, consisting of members of the agricultural classes, is available. The following are listed as types of community activities that teachers of agriculture through an organized junior agricultural society are most likely to take part in:

1. Directing the community agricultural surveys
2. Assisting with the community fairs
3. Sending teams to district and State judging contests
4. Holding Father and Son banquets
5. Directing the taking of farm inventories
6. Organizing part time and evening classes
7. Testing seed corn for farmers.

Suggestions to be used in conducting community agricultural surveys have already been included herein.

The community fair as a means of stimulating interest in the agricultural development of a community has no equal. The program and exhibits should be such as will interest all who may attend. The program may consist of community singing, brief addresses, contests, etc. The exhibits should include school, as well as home and home farm exhibits.

The sending of teams representing the local high school to the district and State livestock and crop judging contests will do much to stimulate the classroom instruction, as well as to stimulate an interest in the agricultural department on the part of the patrons of the community.

The holding of Father and Son Banquets for the members of the agricultural classes and their fathers will do much toward developing not only a closer relationship between father and son, but will give the teacher and pupils an opportunity to meet the fathers of all boys enrolled. The cooperation of the teacher of home economics and the girls enrolled for the course is essential to the success of the banquet. A snappy program, consisting of songs, short talks, and games should be planned.

The methods of conducting the taking of farm inventories will be found in Chapter IV, while suggestions for organizing and conducting part time and evening classes have already been given.

Assisting farmers in methods of testing seed corn will prove effective in creating the right attitude toward the agricultural department. Methods of testing will be found herein, under the heading, "Methods of Classroom Instruction."

LIST OF TYPICAL, SUPERVISED PRACTICAL WORK FOR AGRICULTURAL DEPARTMENTS IN MARYLAND

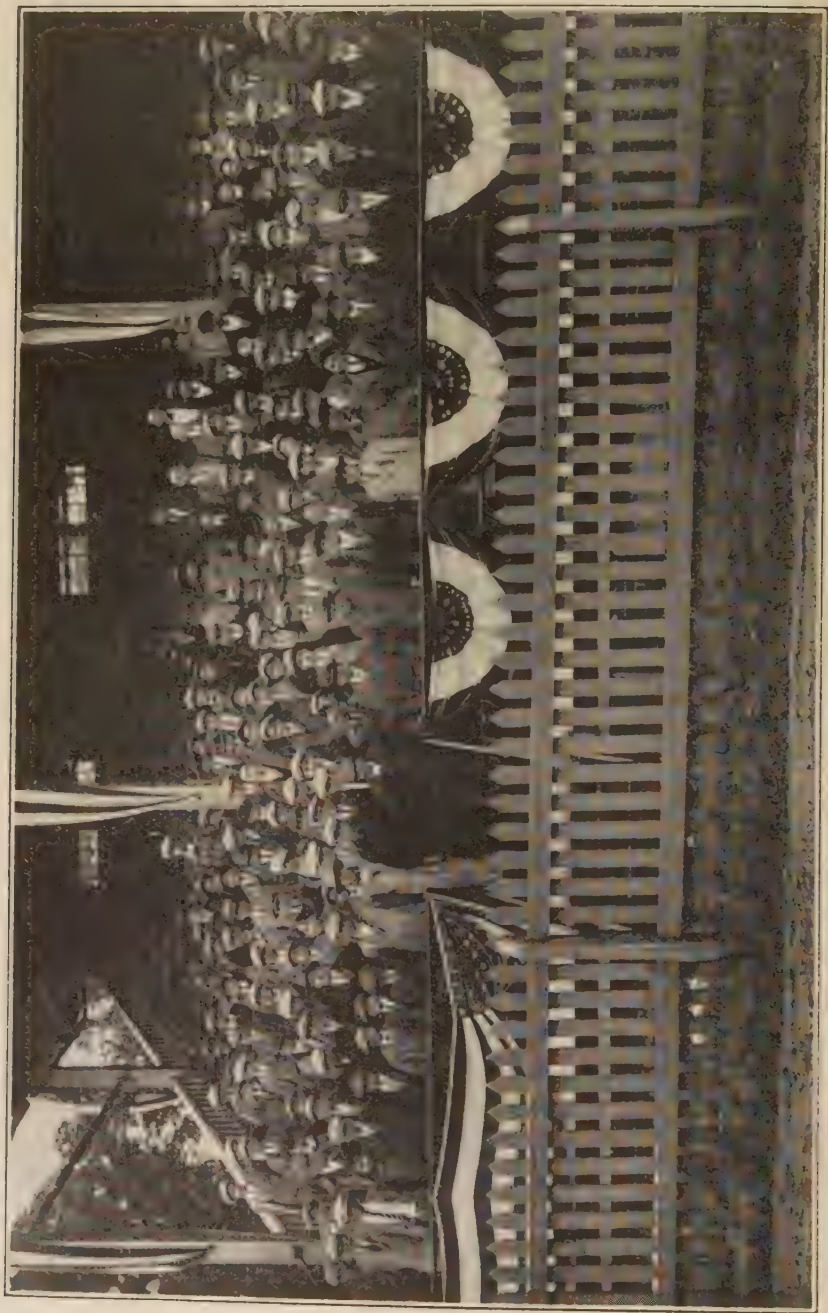
FARM ANIMAL ENTERPRISES

BEE

1. Obtaining and caring for five colonies of bees
2. Extracting and marketing honey from the home apiary

DAIRY

1. Caring for, and management of a dairy herd of from 5-10 cows
2. Obtaining and raising a pure bred dairy calf
3. Testing and keeping daily records on a herd of 10-15 cows



CONTESTANTS IN THE STATE-WIDE VOCATIONAL BOYS' JUDGING CONTESTS, FREDERICK FAIR, 1926

POULTRY

1. Caring for, and management of 50 hens for egg production
2. Hatching and selling 500 day old chicks
3. Hatching, raising and marketing 100 capons or broilers
4. Obtaining and managing a breeding pen of pure-bred poultry
5. Raising fifty pure-bred pullets
6. Raising fifty ducks
7. Raising twenty turkeys or geese

SHEEP

1. Beginning a pure-bred flock with six ewes and one ram
2. Managing twenty-five sheep for wool and mutton
3. Obtaining, care and management of three to five pure-bred ewes and one ram

SWINE

1. Obtaining, growing and breeding two pure-bred sows
2. Raising, fattening and marketing a litter of eight pigs
3. Raising and marketing, at weening time, two litters of pure-bred pigs

PLANT ENTERPRISES**ALFALFA**

1. Caring for, and management of a five-acre field of alfalfa for at least two years
2. Growing a two-acre plot of alfalfa

CLOVER

1. Caring for five acres of clover for hay, or seed

CORN

1. Caring for, and management of five to ten acres of corn
2. Growing two acres of corn from pure-bred seeds

OATS

1. Growing from three to five acres of oats

SOY BEANS

1. Successful growing of three acres of soy beans for seed or hay

SWEET CORN

1. Caring for, and management of three to five acres of sweet corn
2. Growing from one to two acres of sweet corn

WHEAT

1. Successful growing from three to five acres of wheat

HORTICULTURE

1. Planting and care of a two-acre orchard
2. Management of a one-acre bearing orchard
3. Renovating a one-acre orchard
4. Planting and care of one-half acre strawberries, raspberries, or blackberries
5. Harvesting, grading, packing, and marketing fruit from the home orchard

VEGETABLE GARDENING

1. Caring for, and management of a home garden
2. Producing vegetables from at least one-half an acre
3. Producing two or less vegetables from one acre of land

FARM MANAGEMENT ENTERPRISE

1. Keeping a complete record of the entire farm business for one year, including the initial and final inventory
2. Continuing a livestock or farm crops project begun during a preceding year on a larger basis
3. Marketing of crop or livestock products from the home farm for one year

FARM ECONOMICS ENTERPRISE

1. Making local agricultural surveys
2. The completion of farm account projects begun the preceding year
3. Assisting in organizing and conducting local marketing associations

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CHAPTER IV

GOALS, ACTIVITIES THROUGH WHICH THEY MAY BE ACHIEVED, AND EVIDENCES OF ACHIEVEMENT

Goals

Definite goals which will develop appreciations, attitudes, skills and habits and give opportunity for the application of knowledge gained through vocational experiences and personal performance can be set up in no subject more effectively than in vocational education in agriculture. In fact, the efficient teaching of the subject will depend very largely upon the extent to which the pupils enrolled may develop a genuine appreciation and a right attitude toward the subject. Skills and correct habits in the application of knowledge obtained may be developed through vocational experiences and personal performances in connection with the completion of the home project or other supervised practical work.

Finding out the specific abilities of pupils enrolled for instruction in vocational education in agriculture, and comparing these with the specific abilities necessary for success in the occupation of farming is a duty of the agricultural teacher. Since vocational agriculture is a comparatively new study, it is imperative that teachers of the subject give special attention to the setting up of definite goals for attainment.

As a result of studies and observations made, it has been decided that goals, with activities through which they may be achieved, and evidences of achievement, should be set up for each of the following farm enterprises to be taught in Maryland departments:

First Year—Plant Enterprises

Second Year—Farm Animal Enterprises

Third Year—Agricultural Economics and Farm Management

Fourth Year—Community Specialties and Farm Equipment

Definite minimum goals, with activities and evidences of achievement, have, therefore, been set up for each of the farm enterprises outlined. It is expected that not only each of the goals will be achieved, but that additional results will be attained.

Activities Through Which the Goals May Be Achieved

The activities through which the goals may be achieved have been selected with the idea of enabling each pupil enrolled for

the work to participate to the fullest extent feasible. Such participation for each farm enterprise has been provided for through:

1. The preliminary study, in which the pupil's mind is prepared for a more detailed study through a brief discussion as to the importance of the particular farm enterprise in the United States, the State, and especially its adaptation to the local community.
2. Analyzing the enterprise into and listing the principal jobs. In this way the pupil is given an idea as to the scope of the enterprise before any specific phase of it is studied.
3. Classroom instruction, organized on the basis of setting up one particular job for study. The teaching content has been organized in a logical order, with specific references indicated. Each individual teacher will be expected to organize the teaching content from a seasonal standpoint, since no two communities in the State have identical seasonal conditions.
4. The providing of lists of references for more extensive reading. In this way each pupil may be given an opportunity to study in detail a subject in which he is particularly interested.
5. Typical supervised practical work correlating closely with the teaching content. Supervised practical work enables the individual pupil to apply information secured, in a first hand, practical manner.
6. Correlated laboratory exercises, practicums, demonstrations and field trips. This type of instruction offers an opportunity for a maximum of pupil activity, and at the same time gives an opportunity for securing applied knowledge.
7. Correlated farm shop work, thus providing for the pupil who is more or less motor minded. Through farm shop work each pupil may develop skill in the use of such tools as will be needed on a typical farm.
8. The correlation of agriculture with the other high school subjects. Such correlations will not only broaden the individual pupil, but will tend to develop within him a higher appreciation for all high school subjects. For examples of possible correlations, see Farm Animals, Farm Management and Agricultural Economics enterprise outlines.
9. Such equipment and materials as are needed for the different types of instruction should be provided.

Evidences of the Achievement of Goals

While it is not expected that one hundred per cent of the pupils enrolled for instruction in vocational education in agriculture will enter the vocation of farming, it is expected that a majority of all pupils completing any one farm enterprise will have achieved in that enterprise:

1. Ability to apply the knowledge secured to practical situations
2. Habits of skill in individual performances
3. Attitudes of appreciation for the enterprise

Selecting Adapted Subject Matter Units

The relative importance of the most important farm enterprises is indicated by the following data taken from the United

State Census of Agriculture for Maryland for 1925 as a guide in selecting subject-matter units:

1. "Principal crops (1924):

Corn harvested for grain	acres	480,801
	bushels	13,345,718
Corn cut for silage	acres	18,311
	tons	127,752
Wheat	acres	484,659
	bushels	7,664,394
Oats threshed for grain	acres	40,135
	bushels	1,173,397
Barley	acres	10,783
	bushels	288,522
Rye	acres	14,610
	bushels	183,575
Hay	acres	401,505
	tons	529,320
Tobacco	acres	31,700
	pounds	22,473,735
Potatoes, white	acres	36,501
	bushels	3,408,106
Sweet potatoes and yams	acres	6,683
	bushels	941,314
Strawberries	acres	11,995
Sweet corn	acres	43,051
Tomatoes	acres	52,892
Apples	trees not of bearing age	488,554
	trees of bearing age	1,696,549
	bushels harvested	1,734,056
Peaches	trees of all ages	1,042,883
	bushels harvested	544,138
Pears	trees of all ages	285,981
Grapes	vines of all ages	328,839

2. "Livestock products (1924)

Dairy products—

Milk produced*	gallons	74,042,696
Butter made on farms	pounds	5,255,281
Butterfat sold	pounds	1,891,383
Cream sold	gallons	245,581
Whole milk sold	gallons	42,982,724

Wool—

Wool produced*	pounds	429,914
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Eggs and chickens—

Chicken eggs produced*	dozens	20,068,986
Chickens raised	number	6,025,180

*Total production, including estimates for incomplete reports.

3. "Principal kinds of livestock (1925)

Cattle, other than dairy cows	99,928
Dairy cows	172,581
Sheep	91,878
Swine	187,656
Chickens	4,198,305
Horses and mules	147,444

4. Number of farms (1925).....	49,001
Number white farmers.....	42,280
Number colored farmers.....	6,721
5. Percentage of tenancy (1925).....	26.4
6. All land in farms (1925).....acres	4,433,398
a. Crop land.....acres	2,227,515
b. Pasture land.....acres	892,910
c. Woodland not used for pasture.....acres	945,760
d. All other land in farms.....acres	367,213

The stress to be given the different farm enterprises in the respective departments will depend very largely upon the results of the agricultural survey of the local community.

CORN ENTERPRISE

Goals of Achievement

- A. Yield as producing a maximum yield of corn per acre with a minimum investment of labor and as the lowest possible cost per bushel.
- B. Ability to decide if corn is the most economical crop to use, and to arrange it in the rotation at the proper place.
- C. Skill in the feeding and marketing of corn.
- D. Exhibiting successfully varieties of corn grown as a project.
- E. The realization of the feeding value of corn, and its importance as an agricultural crop in the United States.

Activities Through Which Goals May Be Achieved

A. THROUGH PERSONAL EXPERIENCE

1. Yields and yield of corn as compared with other crops of the United States.
2. Comparison of production by states per square mile.
3. Yield in United States as compared with world production.
4. Uses of corn.
5. The place of corn in a crop rotation.

B. BY LISTING THE PRINCIPAL JOBS

1. Selecting seed corn.
2. Testing seed for germination.
3. Plowing the corn.
4. Preparing the seed bed.
5. Planting.
6. Cultivating.
7. Controlling diseases and insects.
8. Harvesting.
9. Shelling corn.
10. Storing corn.
11. Marketing corn.
12. Keeping records and accounts.
13. Making an analysis of results.

C. THROUGH CLASSROOM INSTRUCTION

Job

Teaching Content

1. Selecting seed corn (a) Time; (b) kind of seed to select; (c) varieties suited to local conditions.

References: *Wheat*, pp. 240-241; *Wm. Exp. Cir.* 32, pp. 3 and 4; *June Exp.* 184, pp. 1 and 2; *Cor. Exp.* 123, pp. 111 and 115; *Md. Exp.* 17, 19, 217; *F. & E.* 1375, 227; *Ill. Exp. Cir.* 225; *N. D. Exp. Cir.* 44; *E. & W. Exp. Cir.* 1341; *Ind. Exp.* 224; *Conn. Exp.* 272; *Penn. Ext. Cir.* 63.

2. Testing seed for germination

(a) Kind of tester to use; (b) running the test.

References: *F. & E.* 945; *Md. Ext.* 17; *Cor. Ext.* 26; *Cox*, p. 75; *Mont.*, pp. 62-64.

3. Plowing for corn (a) Depth; (b) time; (c) method.
References: Cox, pp. 87-88; Mont., p. 68; F. B. 414, 1149; Md. Ext. Bul. 17, pp. 29-30.
4. Preparing the seed bed (a) Manuring and fertilizing; (b) time to prepare seed bed, and method.
References: Dav., pp. 68-70; N. J. Ext. Bul. 30; F. B. 537, p. 10; Cor. Jr. Ext. Bul. 8, p. 7; Mont., p. 68; Cox, p. 91; Md. Ext. 17, p. 28; Mos., pp. 204-5.
5. Planting (a) Rate; (b) time to plant; (c) equipment; (d) depth.
References: Tenn. Exp. 124; F. B. 537; Ybk. 1921, p. 184; Cor. Jr. Ext. Bul. 8; Mont., p. 71; Ram., p. 314; Mos., p. 206.
6. Cultivating corn (a) Implements; (b) frequency; (c) depth; (d) reasons for, and methods; (e) reducing costs by using smoothing harrow.
References: Ram., pp. 289-300; Dav., pp. 73, 192; Mont., pp. 74, 78; F. B. 303, 414, 537; Mos., p. 208.
7. Combating insects and diseases (a) Cut worm; (b) army worm; (c) corn ear worm; (d) corn root aphid; (e) weevil; (f) corn stalk borer; (g) clinch bug; (h) European corn borer; (i) root stalk and ear rot; (j) white grub; (k) mold.
References: F. B. 872, 891, 915, 1029, 1229, 1025, 539, 1223, 1242, 1294, 1176, 1062; Mos., pp. 216, 218, 219, 220; Ill. Exp. 44; Tex. Exp. 270.
8. Harvesting corn (a) Use of machinery; (b) method; (c) hog-down; (d) cost; (e) time.
References: F. B. 614, 992; Ram., pp. 399-405; Mont., 84, 82, 89; Dav., p. 194; Mos., pp. 211-3; Ind. Exp. 175, Vol. 17.
9. Storing corn (a) Requirement for ventilation; (b) dryness; (c) soft corn.
References: Ill. Exp. 293, 222, 225; Cor. Les. 129, p. 115; F. B. 537, 1175; Iowa Exp. 104; Wis. Ext. Cir. 58, p. 5; Mont., p. 84; Neb. Exp. 163.
10. Judging corn (a) Object; (b) method; (c) score card.
References: Md. Ext. Bul. 29; Dav., pp. 199-203; Mos., pp. 190-192; Mont., pp. 95-103; Md. Score Card.
11. Marketing (a) Grading; (b) cooperative marketing; (c) marketing through livestock.
References: U. S. Dept. Handbook wheat, shelled corn and oats, 90; F. B. 614, 1144; Jes., pp. 23-43; H. and M., p. 117; App., pp. 536-548.

12. Keeping records (a) Kind; (b) method.

References: *F. B.* 511, 572, 1139, 682, 1182; *Wa. Ch.* 14; *C. L. M.*; *Ybk.* 1917 or Sep. 735; *Ybk.* 1921 or Sep. 876; *App. Chs.* 13, 14, 12; *B. Ch.* 15; *Ad. Chs.* 16, 17, 18, 19.

13. Making an analysis of results (a) Economic; (b) educational; (c) plan of improvement—situation and outlook.

References: *F. B.* 1139; *Wa. Ch.* 20; *Dav. Ch.* 1; *Ybk.* 1921, pp. 219-26.

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Cox—Cox “Crop Production and Soil Management.” Wiley & Sons, New York.

Mos.—Mosier “Soils and Crops.” Rand-McNally Co., Chicago.

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E. THROUGH TYPICAL SUPERVISED PRACTICAL WORK

1. Care and management of from five to ten acres of corn
2. Growing two acres of corn from purebred seed

F. THROUGH CORRELATED LABORATORY EXERCISES, DEMONSTRATIONS, PRACTICUMS, SURVEYS AND FIELD TRIPS

1. Identify varieties
2. Select corn in the field
3. Prepare seed corn for storage
4. Test seed corn
5. Observe diseases and insects
6. Grade seed corn
7. Calibrate planter
8. Judge corn
9. Survey methods of cultivation
10. Observe hogging down corn
11. Visit grain elevator
12. Study of corn products

G. THROUGH CORRELATED FARM SHOP

1. Construct seed corn rack
2. Construct seed corn tester
3. Prepare planter and other implements

III Equipment and Materials

A. NECESSARY

1. Seed corn testing outfit
2. Seed corn rack
3. Bags for field selection of seed

B. DESIRABLE

1. Corn stalk chemical testing outfit
2. Necessary equipment for grading corn
3. Charts, maps, and lantern slides
4. Fertilizer exhibits. See bulletins State Fertilizer Inspection Service, College Park, Maryland

IV Evidences of the Achievement of Goals

- A. THE SUCCESSFUL COMPLETION OF CORN PROJECTS, SELECTED BY MEMBERS OF THE CLASS
- B. MEMBERS OF THE CLASS ENGAGED IN CORN BREEDING OR PRODUCTION EXPERIMENTS

SWEET CORN ENTERPRISE

I Goals of Achievement

- A. Ability to decide whether or not sweet corn should be grown in the local community
- B. The planting, managing, harvesting, and marketing of the crop in the most economical and intelligent manner

II Activities Through Which Goals May Be Achieved

A. THROUGH PRELIMINARY STUDY

1. Value and yield of sweet corn as shown by a local survey
2. The relation of sweet corn to a crop rotation
3. Harvest comes when it does not interfere with other urgent farm work
4. Market and rate of pay is certain
5. It is an important cash crop in Maryland—the leading sweet corn States are Illinois, Iowa, Maryland, Ohio, Indiana, Maine, and Minnesota
6. The crop has a quick turnover

B. BY LISTING THE PRINCIPAL JOBS

1. Locating the field
2. Procuring the seed
3. Testing seed for germination
4. Preparing the soil for the crop
5. Buying fertilizer and lime
6. Planting
7. Cultivating
8. Combating disease and insects
9. Selecting of seed corn in field
10. Harvesting
11. Marketing
12. Keeping records and accounts
13. Making an analysis of results

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|--|
| 1. Locating the field | (a) Acreage to be planted; (b) market outlook; (c) labor available; (d) soil requirements. |
| <i>References: Outlook, U. S. Dept. of Ag. Econ.; Mgr. of Factory; Local Survey; Cor. Ext. 97, pp. 2-7; Wis., p. 10; Ma. Ext. 140, p. 2; Wis. Ext. Cir. 196, p. 3.</i> | |
| 2. Procuring the seed | (a) Varieties suitable; (b) importance of canners' control over seed. |
| <i>References: Cor. Ext. 97, p. 10; Wis. Ext. Cir. 96, pp. 7-8; Mont., p. 94.</i> | |
| 3. Testing seed for germination | (a) The kind of testers; (b) making the test. |
| <i>References: F. B. 948; Md. Ext. 17; Cor. Ext. 26; Cox, p. 75.</i> | |

4. Preparing the soil for the crop (a) Manuring; (b) liming methods; (c) liming materials; (d) liming sources; (e) kinds of lime; (f) plowing—depth, time, method; (g) preparing seed bed.
References: *Cor.* 95, p. 5; *Wis. Ext. Cir.* 196, p. 4; *Ma. Ext.* 140, p. 4; *Ma. Ext.* 40, p. 3; *Wis. Exp.* 312; *Md. Ext.* 2, 140, 11; *F. B.* 921, 1149, 537, 414; *Cox*, p. 87-91; *Mont.*, p. 68; *Cor.* 97, p. 4; *Cor. Jr. Ext. Bul.* 8, p. 7.
5. Buying fertilizer and lime... (a) Kind to use and the amount.
References: *Cor. Ext.* 97, p. 6; *Ma. Ext.* 140, p. 4; *Wis. Ex. Cir.* 196, p. 3.
6. Planting (a) Rate or distance of rows and hill apart; (b) time; (c) method; (d) depth.
References: *Tenn. Exp.* 124; *Cor. Ext.* 97, p. 8; *Wis. Ext. Cir.* 196, p. 3; *Ma. Ext.* 140, p. 6; *Neb. Exp.* 112, p. 30; *Ill. Exp.* 126, pp. 336-7; *Ind. Exp.* 64, p. 4; *Ram.*, p. 314.
7. Cultivating (a) Kind of cultivator to use; (b) frequency; (c) depth and method.
References: *Ram.*, pp. 289-300; *F. B.* 414, pp. 28-35; *Cor. Ext.* 97, p. 9; *Ma. Ext.* 140, p. 7; *Wis. Ext. Cir.* 196, p. 3; *F. B.* 537, p. 14.
8. Combating disease and insects of corn (a) Cut worm; (b) corn borer; (c) corn ear worm; (d) corn root aphid; (e) corn stalk borer; (f) corn diseases; (g) European corn borer.
References: *F. B.* 129, 739, 1310, 891, 1025, 1171, 1242, 1294, 915, 950, 1371, 908, 872, 939, 725, 773, 537, 875, 1124, 1176.
9. Selecting seed corn in the field (a) Time to select; (b) kind of seed to select; (c) storing seed; (d) importance of separate seed plot.
References: *Mont.*, pp. 60-63; *Wis. Ext. Cir.* 58, pp. 3 and 5; *Iowa Ext. Bul.* 104, pp. 1 and 3; *Cor. Les.* 192, pp. 113 and 115; *Md. Ext. Bul.* 17, pp. 3 and 5; *F. B.* 1175, 537; *Ill. Exp. Cir.* 225, pp. 5 and 7.
10. Harvesting (a) Time; (b) method.
References: *Md. Exp. Bul.* 254, p. 53; *Cor. Ext. Bul.* 97, p. 11; *Ma. Ext. Bul.* 140, p. 8.
11. Marketing (a) Method.
References: *Wis. Ext. Cir.* 96, p. 10; *Minn. Exp. Bul.* 211, p. 84; *Jes.*, pp. 1-23; *App.*, pp. 564-596; *Hor. Ch.* 1; *Mac.*, pp. 1-34; *F. B.* 1144, p. 5.
12. Keeping records (a) Kinds; (b) methods of keeping.
References: *F. B.* 511, 572, 682, 1182, 1139; *Wa. Ch.* 14; *C. L. M.*; *Ybk.* 1917, or *Sep.* 735; *Ybk.* 1921, or *Sep.* 876.

13. Analysis of results.....(a) Economic; (b) educational; (c) plan of improvement.

References: F. B. 1139; Davis Ch. 1.

D. READINGS

1. Legend to instructional material
 - Cor.—Cornell Bulletin, Cornell University, Ithaca, N. Y.
 - Wis.—Wisconsin Bulletin, University of Wisconsin, Madison, Wis.
 - Ybk.—Yearbook, United States Department of Agriculture.
 - Wil.—Wilkinson "Sweet Corn." Orange, Judd Co., New York.
 - Ma.—Maine Bulletin, Orono, Maine.
 - Mont.—Montgomery "Productive Field Crops." Lippincott Co., Philadelphia, Pa.
 - F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.
 - Md.—Maryland Bulletin, College Park, Maryland.
 - Cox—Cox "Crop Production and Soil Management." John Wiley & Sons, New York.
 - Tenn.—Tennessee Bulletin, College of Agriculture, Knoxville, Tennessee.
 - Ram—Ramsower "Equipment for Farm and Farmstead." Ginn & Co., New York.
 - Iowa—Iowa Bulletin, Ames, Iowa.
 - Jes.—Jesness "Cooperative Marketing of Farm Products." Lippincott Co., Philadelphia, Pa.
 - App.—"Farm Economics." Lippincott Co., Philadelphia, Pa.
 - Hor.—Horner "Agricultural Marketing." John Wiley & Sons, New York.
 - Mac.—Macklin "Efficient Marketing for Agriculture." The Macmillan Co., New York.
 - Wa.—Warren "Farm Management." Macmillan Co., New York.
 - C. L. M.—Currier, Lennes and Merrill. Macmillan Co., New York.

E. THROUGH TYPICAL SUPERVISED PRACTICE WORK

1. Care and management of three to five acres of sweet corn
2. Growing from one to two acres of sweet corn

F. THROUGH CORRELATED LABORATORY EXERCISES, DEMONSTRATIONS, PRACTICUMS, SURVEYS AND FIELD TRIPS

1. Testing seed for germination
2. Identifying varieties of sweet corn
3. Storing seed corn
4. Observing diseases and insects
5. Grading seed corn
6. Calibrating planter
7. Surveying methods of cultivation
8. Visiting canning factory

G. THROUGH CORRELATED FARM SHOP,

1. Constructing seed corn rack
2. Construct seed corn tester
3. Preparing planter and other implements

III Equipment and Materials

1. Seed corn testing outfit
2. Seed corn rack
3. Charts; maps and lantern slides

IV Evidences of the Achievement of Goals

- A. THE SUCCESSFUL COMPLETION OF THE SWEET CORN PROJECTS
SELECTED
- B. THE GROWING AND MARKETING OF SWEET CORN AS SUPERVISED
PRACTICAL WORK
- C. THE CONTROLLING OF INSECTS AND DISEASES OF SWEET CORN

WHEAT ENTERPRISE

I Goals of Achievement

- A. Ability to grow a crop of wheat, successfully
- B. Ability to select variety best suited to local conditions

II Activities Through Which Goals May Be Achieved

A. PRELIMINARY STUDY

- 1. Value of wheat as a cash crop
- 2. Place of wheat in the crop rotation
- 3. Importance of wheat to individual farmers in Maryland

B. BY LISTING THE PRINCIPAL JOBS

- 1. Deciding upon acreage to sow to wheat
- 2. Securing of seed
- 3. Fertilizers
- 4. Liming for crop
- 5. Plowing
- 6. Preparing of seed bed
- 7. Sowing of wheat
- 8. Harvesting and threshing
- 9. Marketing the crop
- 10. Controlling weeds, insects and diseases
- 11. Keeping record

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|--|
| 1. Deciding upon acreage to sow to wheat..... | (a) Type of farming; (b) size of farm; (c) type of rotation, climatic conditions; (d) soil types; (e) comparison of production per square mile of improved land by States. |
| <i>References: F. B. 678, 895.</i> | |
| 2. Securing of seed..... | (a) Judging; (b) varieties. |
| <i>References: Cox, p. 72; Liv., pp. 131-132; Mont., pp. 128-129; F. B. 1280; W. W. 138-140.</i> | |
| 3. Fertilizers | (a) Plant food most needed; (b) type of crop grown before; (c) sources; (d) analysis; (e) price; (f) amount. |
| <i>References: Cox, pp. 249-250; Liv., pp. 129-179; W. W., pp. 135-6; Mont. 125-126; Md. 237, 242.</i> | |
| 4. Liming for crop..... | (a) Analysis of lime; (b) when to apply; (c) method of applying; (d) amount; (e) kind used. |
| <i>References: Mos., pp. 90-91; Mont., p. 38; W. W., p. 35; Cox, p. 250.</i> | |

5. Plowing for crop..... (a) Kind of plows; (b) time of plowing; (c) depth of plowing.
References: Mont., p. 124; *Cox*, p. 247; *Liv.*, p. 129; *W. W.*, p. 136.
6. Preparing seed bed..... (a) Harrowing; (b) discing; cultipacking.
References: Cox, pp. 246-247; *Liv.*, pp. 129-131; *Mont.*, p. 124; *W. W.*, pp. 136-8.
7. Sowing of wheat..... (a) Time; (b) rate; (c) depth.
References: Mos., pp. 236-237; *Mont.*, pp. 127-128; *Cox*, pp. 248-249; *Mos.*, pp. 236-237.
8. Harvesting and threshing... (a) Time of harvesting; (b) machinery used; (c) time to thresh.
References: Cox, pp. 179-184; *Liv.*, pp. 134-136; *W. W.* 142-146; *Mont.*, pp. 132-133.
9. Marketing the crop..... (a) Methods; (b) time; (c) comparison of hard and soft winter wheat, as to use.
References: Mont., pp. 133-144; *Cox*, pp. 257-270; *W. W.* 147-150; *Liv.*, pp. 113-115; *U. of Md. Ext. Bul.* 30.
10. Controlling weeds, insects and diseases (a) Hessian fly; (b) chinch bug; (c) weevil; (d) rust; (e) scab; (f) garlic.
References: Mont., pp. 137-140; *Liv.*, pp. 142-144; *W. W.* 155-9; *Cox*, pp. 147-156.
11. Keeping records (a) Kind of records.
References: Mont., pp. 133-135; *Cox*, p. 271; *W. W.* 150-2; *Liv.*, pp. 119-122.

D. REFERENCES

1. Legend

Mont.—Montgomery "Productive Farm Crops." Macmillan Co., New York.

Liv.—Livingston "Field Crop Production." Macmillan Co., New York.

Mos.—Mosier "Soils and Crops." Rand McNally Co., Chicago.

C.—Cox "Crop Production and Soil Management." John Wiley & Sons, New York.

W. W.—Wilson and Warburton "Farm Crops." Webb Pub. Co., New York.

F. B.—Farmers' Bulletin, U. S. Department of Agriculture, Washington.

Md.—University of Maryland, College Park, Maryland.

E. THROUGH TYPICAL SUPERVISED PRACTICAL WORK

1. Growing from three to five acres of wheat

F. THROUGH CORRELATED LABORATORY EXERCISES, PRACTICUMS, DEMONSTRATIONS AND FIELD TRIPS

1. Comparing samples of grain
2. Study of the plant food taken from the soil by wheat
3. Adding of plant food
4. Study of plows
5. Test for germination
6. Study of drills
7. Study of binders
8. Study of threshers
9. Grading of wheat

G. THROUGH CORRELATED FARM SHOP

1. Repairing machinery

III Equipment and Materials

A. NECESSARY EQUIPMENT

1. Tester for testing weight per bushel
2. Tripod lens
3. Sieves for grading

B. DESIRABLE

1. Moisture tester
2. Oats removing machine
3. Fertilizer samples
4. Samples of weed seeds
5. Fertilizer and machinery charts—John Deere, Moline, Ill., and J. I. Case, Racine, Wisconsin.
6. Booklets, charts and exhibits—Washburn Crosby Co., Russell-Miller Milling Co., and Pillsbury Flour Mills, all of Minneapolis, Minn.
7. Magazine—"Better Crops"—10 Bridge Street, N. Y.

IV Evidences of the Achievement of Goals

- A. THE ECONOMICAL PRODUCTION OF WHEAT BY FORMER MEMBERS OF THE CLASS
- B. THE GROWING OF WHEAT, UNDER SUPERVISION, BY BOYS ENROLLED FOR VOCATIONAL AGRICULTURE

OATS ENTERPRISE

I Goals of Achievement

- A. Ability to grow a crop of oats, successfully
- B. Ability to select variety best adapted to local conditions
- C. A realization of the value of oats as a feed

II Activities Through Which Goals May Be Achieved

A. PRELIMINARY STUDY

1. The value of oats in the crop rotation
2. The value of oats as a feed
3. The economy of oat production

B. BY LISTING THE PRINCIPAL JOBS

1. Selection of seed
2. Preparing seed bed
3. Fertilizers
4. Sowing
5. Harvesting
6. Marketing and home farm consumption
7. Keeping records

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|--|
| 1. Selection of seed | (a) Judging; (b) variety adaptations.
<i>References: Mont., pp. 172-173; Mos., pp. 254-255.</i> |
| 2. Preparing seed bed..... | (a) Type of seed bed best suited to the crop; (b) plowing; (c) harrowing; (d) culti-packing.
<i>References: Mont., pp. 157-166; Liv., pp. 161-162; Mos., pp. 254-255.</i> |
| 3. Fertilizers | (a) Source; (b) proper analysis; (c) price; (d) amount; (e) grade.
<i>References: Mont., pp. 158-159; Cox, pp. 111-114; Mos., pp. 112-113; Liv., p. 157.</i> |
| 4. Sowing | (a) Time; (b) rate; (c) depth.
<i>References: Mont., pp. 162-164; Liv., pp. 157-160; Cox, pp. 277-278; W. W., pp. 176-177.</i> |
| 5. Harvesting | (a) Maturity; (b) time of cutting.
<i>References: Mont., p. 167; Cox, pp. 180-2, 279; Liv. 160-161; Mos. 261-262.</i> |
| 6. Marketing and home farm consumption | (a) Methods; (b) uses.
<i>References: Mont., pp. 281-284; W. W. 182-185; Liv., pp. 151-153; Cox, pp. 281-284.</i> |
| 7. Keeping records | (a) Types of records.
<i>References: Mont., p. 153; Cox, p. 281; Liv., pp. 153-154.</i> |

D. REFERENCES**1. Legend to references**

Mont.—Montgomery "Productive Farm Crops." Macmillan Co., N. Y.

Mos.—Mosier "Soils and Crops." Rand McNally Co., Chicago.

L.—Livingston "Field Crop Production." Macmillan Co., New York.

C.—Cox "Crop Production and Soil Management." John Wiley & Sons, N. Y.

W. W.—Wilson and Warburton "Farm Crops." Webb Pub. Co., St. Paul, Minn.

E. THROUGH TYPICAL SUPERVISED PRACTICAL WORK**1. Growing from three to five acres of oats****F. THROUGH CORRELATED LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS AND FIELD TRIPS**

1. Examination of seed
2. Germination tests
3. Harmful effects of the use of too much fertilizer
4. Controlling diseases
5. Study of fertilizers
6. Controlling diseases and insects

III Equipment and Materials**A. NECESSARY**

1. Tripod lens
2. Tester for testing weight per bushel
3. Seed tester

B. DESIRABLE

1. Microscope
2. Fertilizer samples
3. Soil moisture tester
4. Charts

IV Evidences of the Achievement of Goals**A. A PRACTICAL DEMONSTRATION SHOWING THE VALUE OF OATS AS A FEED****B. THE GROWING OF OATS, AS SUPERVISED PRACTICAL WORK, BY MEMBERS OF THE CLASS**

ALFALFA ENTERPRISE

I Goals of Achievement

- A. Skill in successfully growing alfalfa, and a realization of its importance as a farm crop
- B. Ability to decide whether alfalfa should be grown by the individual as a project, or as supervised practical work, in a given locality

II Activities Through Which The Goals May Be Achieved

A. THROUGH PRELIMINARY STUDY

1. The importance of alfalfa
 - a. Adaptability
 - b. Yield and quality
 - c. Relative cost of producing
 - d. Importance in a rotation considering the average life as being from two to three years
2. Alfalfa helps stabilize the farm business.
 - a. Insures against wide fluctuations in income
 - b. Assists in weathering the financial storms when used as a feed for the livestock enterprises
 - c. Superior feed, at a low unit cost

B. BY LISTING THE PRINCIPAL JOBS

1. Securing the seed
2. Choosing a field and preparing it for the crop
3. Inoculating
4. Sowing the seed
5. Caring for the crop
6. Combating pest and disease
7. Harvesting the crop
8. Marketing the crop
9. Keeping records and accounts
10. Analysis of results

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|---|
| 1. Securing the seed..... | (a) Germination test; (b) purity test; (c) varieties; (d) disease and insect free seed. |
| <i>References: Mont.</i> , p. 14; <i>Ste.</i> , pp. 166-174 and 58-75; <i>Md. Exp. Bul.</i> 228, p. 229; <i>F. B.</i> , 636, 1283, 1467; <i>Mos.</i> , p. 309; <i>Coæ</i> , pp. 72-73. | |
| 2. Choosing a field and preparing it for the crop..... | (a) Soil requirements; (b) climate requirements; (c) drainage; (d) liming; (e) fertilizing; (f) preparing seed bed. |
| <i>References: F. B.</i> 1283, pp. 6-11; <i>Md. Exp. Bul.</i> 228, pp. 207-9, 221-2; <i>Ste.</i> , pp. 82-89, 143-156; <i>Mont. Ch.</i> 41. | |

3. Inoculating(a) Method to use—soil method, culture; (b) time to inoculate; (c) reason for inoculating; (d) effect if not inoculated.
References: F. B. 1283, p. 12, No. 1496; Md. Exp. 228, pp. 211-214; Ste., pp. 132-143; Mont., pp. 390-391; Cox, pp. 417-418; Mos., p. 309.
4. Sowing the seed.....(a) Method to use; (b) time; (c) rate; (d) in mixtures; (e) with nurse crop.
References: F. B. 1283, pp. 12-17; Md. Exp. Bul. 228, pp. 216-219; Mont., p. 391; Ste., pp. 174-185; Cox, pp. 416 and 418; Mos., p. 309.
5. Caring for the crop.....(a) Combating weeds; (b) cultivating; (c) pasturing; (d) clipping.
References: F. B. 1283, pp. 21-23; Md. Exp. Bul. 228, pp. 223-224; Mont., pp. 393-394; Ste., pp. 186-212; Mos., pp. 311-312; Cox, p. 419.
6. Combating pests and diseases(a) Brown root rot; (b) crown-wart; leaf spot; (d) yellow leaf blotch; (e) grasshopper; (f) weevil; (g) chalcis fly; (h) webworm; (i) clover root borer; (j) green clover worm; (k) caterpillar.
References: F. B. 1185, 636, 944 and 1283; Mos., p. 312; Md. Exp. Bul. 228, p. 226; Ste., pp. 341-377; F. B. 982 and 1094.
7. Harvesting the crop(a) Cutting the crop; (b) curing the crop; (c) storing the crop.
References: F. B. 1283, pp. 23-24; Cox, pp. 420-421; Mont., pp. 392-3; Ste., pp. 244-274, 291-297.
8. Marketing the crop(a) Requirements; (b) grades; (c) uses.
References: Ste., pp. 297-309; Mont., pp. 394-395; Cox, p. 408; Mos., p. 310; F. B. 1229 and 1283.
9. Keeping records and accounts(a) Kind to keep; (b) method of keeping.
References: C. L. M.; Wa. Ch. 14; F. B. 511, 572, 682, 1139, 1182; Ybk. 1917, Sep. 735; Ybk. 1921, Sep. 876.
10. Making an analysis of results(a) Economical; (b) educational; (c) plan of improvement.
References: F. B. 1139; Agricultural Outlook (U. S. Dept. Agr. Bur. of Ag. Econ.).

D. REFERENCES**1. Legend to references**

- Ste.—Stewart "Alfalfa Growing." Macmillan Co., New York.
Mont.—Montgomery "Productive Farm Crops." Lippincott Co., Philadelphia..
Md.—University of Maryland, College Park, Maryland.
F. B.—Farmers' Bulletins, U. S. Department of Agriculture, Washington, D. C.
Mos.—Mosier "Soils and Crops." Rand-McNally Co., Chicago.
Cox—Cox "Crop Production and Soil Management." Wiley Co., New York.
C. L. M.—Currier, Lennes and Merrill "Farm Accounting." Macmillan Co., New York.
Wa.—Warren "Farm Management." Macmillan Co., New York.
Ybk.—U. S. Department of Agriculture Yearbook, Washington, D. C.
Sep.—U. S. Department of Agriculture Yearbook Separate, Washington, D. C.

E. THROUGH TYPICAL SUPERVISED PRACTICAL WORK

1. Care and management of a five-acre field of alfalfa for at least two years.
2. Growing two acres of alfalfa as a substitute for red clover, and the care of it through the hay period in a rotation

F. THROUGH CORRELATED LABORATORY EXERCISES, SURVEYS, DEMONSTRATIONS, PRACTICUMS, AND FIELD TRIPS

1. Testing seed for germination
2. Testing seed for purity, color
3. Study of roots and nodules
4. Identifying and inoculating seed
5. Study varieties in light of local adaptation
6. The clipping and curing of alfalfa
7. Study of disease and insects
8. Study of alfalfa as a feed
9. Grades of alfalfa observed
10. Observing alfalfa growing

G. THROUGH CORRELATED FARM SHOP

1. Preparing implements for fitting seedbed, sowing, cultivating, and harvesting

III Equipment and Materials

- A. TRIPOD LENS
- B. MICROSCOPE
- C. SEED GERMINATING OUTFIT
- D. SAMPLES OF VARIETIES OF SEEDS
- E. CHARTS, MAPS, AND LANTERN SLIDES

IV Evidences of the Achievement of Goals

- A. THE GROWING OF ALFALFA ON A PROFITABLE BASIS
- B. THE SATISFACTORY COMPLETION OF ALFALFA PROJECTS

CLOVER ENTERPRISE

I Goals of Achievement

- A. Skill in successfully growing crops of clover
- B. Ability to decide which varieties of clover are best adapted to local conditions
- C. Ability to realize the value of clover as a soil improving crop
- D. A realization of the difficulties involved in securing seed.

II Activities Through Which Goals May Be Achieved

A. THROUGH PRELIMINARY STUDY

1. Relation of clover to types of farming
2. Value in maintaining or increasing soil fertility
3. Adaptability to rotation and diversified farming

B. BY LISTING PRINCIPAL JOBS

1. Selection of variety
2. Securing seed
3. Germination
4. Inspection and identification
5. Testing soil for acidity
6. Liming
7. Inoculation of seed
8. Sowing
9. Combating diseases and insects
10. Planning rotations
11. Preventing clover failure
12. Harvesting hay
13. Harvesting seed
14. Marketing

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|---|---|
| 1. Selection of variety..... | (a) Adaptability—soil, climate, types of farming. |
| <i>References: Md. Bul. 253; F. B. 1339; P. Ch. 19; C. Ch. 27; L. W. Chs. 14, 16.</i> | |
| 2. Securing seed..... | (a) Source;; (b) quality; (c) purity; (d) supply of seed limited. |
| <i>References: F. B. 1339; P. Ch. 24; C. Ch. 27.</i> | |
| 3. Germination | (a) Methods; (b) purpose; (c) results. |
| <i>References: F. B. 1339; P. Ch. 4; C. Ch. 27.</i> | |
| 4. Inspection and identification | (a) Purpose; (b) how; (c) common weed seed found. |
| <i>References: F. B. 1339; P. Chs. 19, 20, 21, 22; C. Ch. 27; Mont., Ch. 42.</i> | |
| 5. Testing soil for acidity..... | (a) Method collecting sample; (b) Truog test. |
| <i>References: Md. B. 2; Mi. Ch. 13; Wisc. Ex. 312.</i> | |

6. Liming (a) Why necessary; (b) time; (c) amount; (d) kinds of lime; (e) sowing.
References: F. B. 1339; Mi. Ch. 13; P.; F. B. 921; Md. Bul. 140, 2; Wisc. Ex. 312.
7. Inoculation of seed..... (a) Why; (b) methods; (c) securing culture.
References: F. B. 1339; Mi. Ch. 14; P. Ch. 15; Md. Bul. 228; Mo., pp. 390-1; C., p. 417; F. B. 1283, 1496.
8. Sowing (a) Method; (b) rate; (c) nurse crops; (d) time; (e) mixture.
References: F. B. 1339; P. Ch. 19, 20, 21, 22; C. Ch. 27; Mont., Ch. 42.
9. Combating diseases and insects (a) Leaf weevil; (b) root-borer; (c) anthracnose; (d) disease resistant strains.
References: F. B. 1339; C. Ch. 27; P. Ch. 19, 20, 21, 22; O., p. 321.
10. Planning rotation..... (a) Use in rotation; (b) order in rotation.
References: F. B. 1339; Mi. Ch. 17; Mont. Ch. 42; P. Ch. 19.
11. Preventing clover failure.... (a) Causes for failure; (b) remedies.
References: F. B. 1365; P. Ch. 19; C. Ch. 27.
12. Harvesting hay (a) Time cutting; (b) curing; (c) implements used.
References: F. B. 1339; Mont. Ch. 42; P. Ch. 19, 20, 21; C. Ch. 27.
13. Harvesting seed..... (a) Cutting; (b) time.
References: F. B. 1339; Mont. Ch. 42; P. Ch. 19, 20, 21, 22; Cox Ch. 27.
14. Marketing hay..... (a) Grades; (b) baling.
References: F. B. 1339.

D. LEGEND TO REFERENCES

- C.—Cox "Crop Production and Soil Management." John Wiley & Sons, New York.
- F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.
- Md. Bul.—University of Maryland, College Park, Md.
- Mont.—Montgomery "Productive Farm Crops." Lippincott Co., Philadelphia, Pa.
- Mo.—Missouri University, Columbia, Mo.
- Wisc.—Wisconsin University, Madison, Wis.
- Liv.—Livingston "Field Crop Production." Macmillan Co., New York.
- O.—Okane "Injurious Insects." Macmillan Co., New York.
- P.—Piper "Forage Crops." Macmillan Co., New York.
- Mi.—Miller "Soil and Its Management." Ginn & Co., New York.

E. THROUGH TYPICAL SUPERVISED PRACTICAL WORK

1. Care of five acres of clover for hay

F. THROUGH CORRELATED LABORATORY EXERCISES, PRACTICUMS, DEMONSTRATIONS, AND FIELD TRIPS

1. Test soil for acidity
2. Take soil samples
3. Inoculate seed
4. Identify seed
5. Inspect seed
6. Germination of seed
7. Cure hay
8. Study diseases
9. Study common weeds in clover

G. CORRELATED FARM SHOP

1. Splice rope

III Equipment and Materials

A. NECESSARY EQUIPMENT

1. Soil tester and materials
2. Pure culture bacteria
3. Microscope
4. Germination plate
5. Small tripod magnifiers

B. MATERIALS

1. Assortment of varieties of seed
2. Specimens of diseases
3. Specimens of plants

SOY BEAN ENTERPRISE

I Goals of Achievement

- A. Ability to successfully grow a crop of soy beans
- B. Ability to select variety adapted to local conditions
- C. Ability to realize the value of soy beans as a feed and as a soil improver

II Activities Through Which Goals May Be Achieved

A. PRELIMINARY STUDY

1. Value of soy beans as a feed and as a soil improver
2. The relation of soy beans to the types of farming

B. BY LISTING THE PRINCIPAL JOBS

1. Selecting seed
2. Germinating seed
3. Inspecting seed
4. Testing soil for acidity
5. Liming
6. Inoculating
7. Sowing the seed
8. Combating insects and disease
9. Harvesting for hay
10. Harvesting for seed
11. Marketing
12. Keeping records

C. THROUGH CLASSROOM INSTRUCTION

<i>Job</i>	<i>Teaching Content</i>
1. Selecting variety.....	(a) Climatic conditions; variety best suited to local conditions; characteristics of each variety. <i>References: Mont., pp. 426-428.</i>
2. Selecting seed.....	(a) Judging and grading. <i>References: Liv., pp. 309; Mos., pp. 9-10; Cox, pp. 71-73; W. and W., p. 40.</i>
3. Inoculating	(a) Method; (b) use of inoculation and where procured. <i>References: Mont., pp. 429-430; F. B. 1496; Cox, p. 382; Liv., p. 310.</i>
4. Preparing the seed bed.....	(a) Purpose; (b) type of seed bed desired; (c) plowing; (d) harrowing and discing; (e) cultipacker. <i>References: Mont., p. 382; Cox, p. 382; Liv., p. 310; W. and W., p. 358.</i>
5. Sowing the seed.....	(a) Time; (b) rate; (c) depth. <i>References: Mont., p. 428; Liv., pp. 310-311; Cox, pp. 382-383; W. and W., p. 358.</i>
6. Pasturing soy beans.....	(a) Type of animal; (b) proper time to pasture; (c) length of pasturing period. <i>References: Mont., p. 429; Cox, p. 453; W. and W., p. 370; Liv., p. 310; F. B. 973.</i>

7. Harvesting for hay.....(a) Time to harvest; (b) method of curing and storing.
References: Mont., p. 429; *Liv.*, p. 311; *W. and W.*, p. 375; *Mos.*, p. 322; *F. B.* 973.
8. Cutting for silage.....(a) Machinery used; (b) silos and silage; (c) time to cut; (d) machinery used.
References: Mont., p. 429; *W. and W.*, p. 376; *Cox*, pp. 383 and 208; *F. B.* 973.
9. Harvesting for seed.....(a) Time to harvest; (b) method; (c) threshing; (d) storing; (e) machinery used.
References: Mont., p. 428; *Cox*, pp. 383-384; *Mos.*, p. 322; *Liv.*, p. 312; *F. B.* 886.
10. Marketing crop.....(a) Methods.
References: Mont., p. 430; *Cox*, p. 377; *Liv.*, pp. 308-309; *W. and W.*, p. 376.
11. Keeping records.....(a) Types of records; (b) checking up finances.
References: Liv., p. 399.

D. LEGEND TO REFERENCES

- Mont.—Montgomery "Productive Farm Crops." Macmillan Co., New York.
- Liv.—Livingston "Field Crop Production." Macmillan Co., New York.
- Mos.—Mosier "Soils and Crops." Rand, McNally Co., Chicago, Ill.
- Cox—Cox "Crop Production and Soil Management." John Wiley & Sons, New York.
- W. and W.—Wilson and Warburton "Farm Crops." Webb Publishing Co., New York.
- F. B.—Farmers' Bulletin, U. S. Department of Agriculture.

E. THROUGH TYPICAL SUPERVISED PRACTICAL WORK

1. To successfully grow three acres of soy beans for seed
2. To successfully grow three acres of soy beans for hay

F. THROUGH CORRELATED LABORATORY EXERCISES

1. Testing soil for acidity
2. Taking soil samples
3. Germination tests
4. Inoculation
5. Treatment of diseases
6. Insect control

G. THROUGH CORRELATED FARM SHOP

1. Splicing rope

III Equipment and Materials

A. NECESSARY

1. Soil tester
2. Tripod lens
3. Seed tester

B. DESIRABLE

1. Microscope
2. Rope for splicing
3. Specimens of plants
4. Charts

IV Evidences of the Achievement of Goals

- A. SOY BEANS BEING GROWN ADVANTAGEOUSLY IN CROP ROTATIONS
- B. SOY BEAN PROJECTS COMPLETED

TOBACCO ENTERPRISE

I Goals of Achievement

- A. Such knowledge as will enable one to produce tobacco economically, in sections especially adapted
- B. Skills in the practices necessary in the production of tobacco

II Activities Through Which Goals May Be Achieved

A. THROUGH PRELIMINARY STUDY

1. Adaptability of tobacco to local conditions
2. The demand for the product
3. Opportunity members of class will have for supervised practical work

B. BY LISTING THE PRINCIPAL JOBS

1. Selecting the plot
2. Deciding upon the variety
3. Providing the fertilizers
4. Preparing the ground for, and seeding
5. Managing the plant bed
6. Controlling insects and diseases
7. Preparing the plot for, and planting
8. Cultivating the plants
9. Topping and suckering
10. Harvesting
11. Curing and storing
12. Preparing for and marketing

C. THROUGH CLASSROOM INSTRUCTION

*Job**Teaching Content*

1. Selecting the plot.....(a) Soil adaptations; (b) climate adaptations; (c) place in a rotation.
References: S., pp. 359-362; Yearbook 1921; Md. Exp. Bul. 275;

2. Deciding upon the variety....(a) Types; (b) varieties adapted locally; (c) characteristics.
References: S., pp. 362-374; Yearbook 1922; Md. Exp. Buls. 188, 275, 103, 67, 26.

3. Providing the fertilizers.....(a) Requirements; (b) sources.
References: S., pp. 375-388; V. C. Bk.; F. B. 571.

4. Preparing the ground for, and planting.....(a) Burning; (b) applying fertilizer; (c) sowing seed.
References: S., pp. 385-388; V. C. Bk.

5. Managing the plant bed.....(a) Preventing diseases; (b) covering; (c) steam sterilization.
References: F. B. 996; S., pp. 388-391; U. S. D. A. Bul. 1256; V. C. Bk.

6. Controlling insects, and diseases (a) Insects attacking; (b) characteristics and control of each.
References: Va. Exp. Sta. Bul. 228; *S.* 393-400; *U. S. D. A. Bul.* 765; *F. B.* 819; *V. C. Bk.*; *U. S. Dept. Bul.* 1256.
7. Preparing the plot for, and planting (a) Methods; (b) precautions; (c) replanting.
References: S., pp. 401-403; *Md.* 275.
8. Cultivating (a) Early; (b) late; (c) machinery needed.
References: S., pp. 403-405; *F. B.* 571; *V. C. Bk.*
9. Topping and suckering (a) Necessity for; (b) methods.
References: S., pp. 405; *F. B.* 571.
10. Harvesting (a) Time; (b) method; (c) precautions.
References: S. 409-412.
11. Curing and storing (a) Methods; (b) precautions.
References: Bu. Agr. Ec. U. S. D. A.; *S.* 412-421; *V. C. Bk.*; *F. B.* 523.
12. Preparing for and marketing (a) Preparing for; (b) time; markets and requirements.
References: S. 421-426; *V. C. Bk.*; *K.*

D. LEGEND TO INSTRUCTIONAL MATERIAL

S.—Smith—Farm Crops. Smith Publishing Co., Atlanta, Ga.

Note: This book contains numerous references to bulletins on tobacco.

Bu. Agr. Ec.—Bureau of Agricultural Economics, U. S. D. A., Washington, D. C.

F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.

Md.—University of Maryland, College Park, Md.

Yearbook—U. S. D. A., Washington, D. C.

V. C. Bk.—Virginia Carolina Chemical Co., Richmond, Va.

K.—Kentucky Tobacco Products Co., Louisville, Ky.

Va. Exp.—Virginia Experiment Station, Blacksburg, Virginia.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Growing a one acre plot of tobacco
2. Assisting in the caring for from 3 to 5 acres of tobacco.

F. LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS AND FIELD TRIPS

1. Make a local survey to determine the extent to which tobacco is grown.
2. Make chart showing cost of producing tobacco locally
3. Locate the tobacco producing areas on a map of the U. S.
4. Clean tobacco seed.
5. Prepare fertilizer formula adapted locally

6. Prepare practical crop rotations in which tobacco is included
7. Select suitable sites for tobacco beds
8. Treat seed and sow a bed of tobacco
9. Observe and collect tobacco insects
10. Observe methods of planting, cultivating, topping, suckering, harvesting, curing and preparing for market
11. Test seed for germination
12. Spray or dust tobacco bed

G. CORRELATED FARM SHOP WORK

1. Laying out a plant bed
2. Assembling hogsheads
3. Adjusting cover to tobacco bed
4. Preparing tobacco sticks
5. Fitting tiers in tobacco barn

III Equipment

1. Knives, spears, etc.
2. Tobacco Products Company, Louisville, Kentucky—Spraying charts

IV Evidences of Achievement of Goals

1. A majority of former students able to successfully manage a tobacco farm
2. Most of the former students able to make a good profit from tobacco and still leave the land in as good condition as it was before growing the crop
3. Former students active members of the local and State Tobacco Growers' Association.

VEGETABLE GARDENING ENTERPRISE

I Goals of Achievement

- A. Ability to successfully raise vegetables from a small garden
- B. A working knowledge of information on vegetables
- C. Skill in individual performances of standard practices
- D. Right attitudes toward the different phases of correlated instruction
- E. The development of genuine interest in and appreciations for the vegetable gardening industry
- F. A maximum participation in all activities undertaken
- G. The keeping of accurate accounts and records on vegetable growing

II Activities Through Which Goals May Be Achieved

A. THROUGH PRELIMINARY STUDY

1. Adaptability of vegetable growing to the local community
2. The experience of the individuals enrolled
3. The opportunity for practical work
4. Analysis of the vegetable gardening enterprise

B. BY LISTING THE PRINCIPAL JOBS

1. Selecting the site
2. Making the planting plan
3. Selecting and securing seed
4. Testing seed
5. Supplying plant food and amending soil
6. Planting seed
7. Hot beds
8. Transplanting
9. Cold frames
10. Irrigating and draining
11. Cultivating and weeding
12. Thinning and pruning
13. Controlling insects
14. Controlling diseases
15. Harvesting
16. Saving seed
17. Marketing
18. Storing

C. THROUGH CLASSROOM INSTRUCTION

<i>Job</i>	<i>Teaching Content</i>
1. Selecting the site.....	(a) Types of soil adapted to specific garden crops; (b) susceptibility to improvement of original soil types; (c) relationship of slope of soil to warmth, erosion, water and air drainage; (d) economic importance of distance of site from the farm home; (e) diseases which carry over in soil from previous farm crops, e. g., potato scab, tomato wilt, etc.; (f) relation of windbreaks to site.

References: L. Chs. 2 and 14-27; W. Ch. 13; F. B. 924, 937, 936, 1242, 1044; Md. Bul. 3 and 34; S., pp. 149-265.

2. Making the planting plan.....(a) Planting dates for various vegetables; (b) space required for given yields; (c) varieties of vegetables to be planted; (d) length of growing period of selected varieties; (e) depth of planting; (f) distance between plants and between rows; (g) crop successions possible under local conditions; (h) inter-cropping possible under local conditions; (i) advantageous vegetable rotations; (j) location of various vegetables in relation to each other; (k) direction of rows.

References: *L. Chs.* 13-27; *Seed catalogues*; *F. B.*, 232, 254, 289, 354, 664, 829, 901, 924, 936, 937, 1043, 1205, 1242, 1269, 1394; *Md. Buls.* 3, 34, 160, 162, 172, 195, 211, 251; *W. Chs.* 2-12.

3. Selecting and securing seed.....(a) Advantages and disadvantages of home grown, local grown, and distant seed supplies; (b) time of year to secure seed; (c) quantity of seed to save or buy; (d) field selection of seed; (e) factors affecting cross-pollination; (f) relationship of soil type to good seed; (g) methods of eliminating seed impurities; (h) diseases spread by means of plant seeds.

References: *L. Ch.* 4; *F. B.* 924, 937, 1175, 1176, 1332; *Md. Bul.* 34; *S.*; *T. Ch.* 6.

4. Testing seed.....(a) When to test seed; (b) effects of age, storage conditions, temperature and moisture on viability of different garden seeds; (c) normal percentage of germination of various garden seeds; (d) methods of seed testing; (e) detection of root rot in germinated seeds.

References: *L. Ch.* 4; *F. B.* 948; *Md. Bul. No.* 34; *S.*; *T.*, pp. 52-53.

5. Supplying plant food and preparing the seed bed.....(a) Extent to which plant food elements are removed from soil by crops; (b) sources of plant food elements; (c) composts and composting; (d) green manures; (e) commercial fertilizers; (f) quantities, time, and methods of application of various plant foods; (g) advantages and disadvantages of marl, land plaster, burned lime, hydrated lime and ground limestone or oyster shells in counteracting soil acidity; (h) the litmus test for acidity; (i) the Truog test for acidity; (j) preparing the seed bed.

References: *L. Ch.* 5; *D. Ch.* 9; *Chs.* 2-5; *F. B.* 218, 232, 254, 289, 354, 664, 829, 901, 924, 937, 433, 1418, 1044, 1205, 921, 434, 1269, 1394, 1436, 1242; *Md. Buls.* 3, 34, 33; *Md. Bul.* "Fertilizer Analyses."

6. Planting seed (a) Relation of moisture to seed germination; (b) relation of temperature to seed germination; (c) relation of depth of planting to seed germination; (d) relation of size and structure of seed to depth of planting; (e) relation of type and condition of soil to seed germination; (f) methods of making drills; (g) methods of dropping seed; (h) methods of covering seed; (i) methods of firming soil.

References: *L. Ch.* 11; *D. Ch.* 1; *F. B.* 924 and 937; *Md. Bul.* 3 and 34; *T. Chs.* 6, 8, 9.

7. Hot beds (a) Location of hot beds; (b) economic importance of hot beds in vegetable production; (c) types of hot beds and points in favor of each; (d) sources of heat; (e) construction of hot beds; (f) the preparation of manure; (g) the preparation of seed bed; (h) disease precautions; (i) green-houses as compared to hot beds; (j) care of plants.

References: *L.*, pp. 58-69; *U. M. Bul.* 34; *F. B.* 1318, 460; *Mich. Bul.* 20; *T. Chs.* 7, 8.

8. Cold frames (a) Location of cold frames; (b) economic importance of cold frames in vegetable production; (c) construction of cold frames; (d) sources of heat; (e) preparation of seed bed; (f) care of the cold frame.

References: *L.*, pp. 58-69; *U. M. Bul.* 34; *Mich. Bul.* 20; *F. B.* 1318, 460; *T. Ch.* 7.

9. Transplanting (a) Reasons for transplanting; (b) age of plants for transplanting; (c) behavior of different plants; (d) character of plant desired; (e) methods of transplanting; (f) precautions for successful transplanting.

References: *L.*, pp. 48-57; 125; *U. M. Bul.* 34; *T.*, pp. 67-71.

10. Irrigating and draining (a) Irrigation system; (b) methods of applying water; (c) importance of irrigation; (d) where drainage will help; (e) kinds of drains; (f) effects of drainage.

References: *D. Ch.* 10; *L. Ch.* 6; *T. Ch.* 11.

11. Cultivating and weeding..... (a) Conditions necessary for proper cultivation; (b) suitable implements; (c) cultivating the crop; (d) results of cultivation; (e) the use of the hoe; (f) harmful effects of weeds; (g) weeding by hand.

References: *T. Ch.* 10; *L.*, pp. 116, 227, 246, 256, 269, 166; *Md. Bul.* 34; *F. B.* 1320, 1394, 433, 289, 1044, 1269, 829, 934, 354, 1338, 1233, 232, 1431, 937, 289, 907, 434.

12. Thinning and pruning..... (a) Advantages of thick sowing; (b) conditions which will eliminate thinning; (c) thinning table for various vegetables; (d) pruning vegetables.

References: *Md. Bul.* 34; *F. B.* 1394, 1431, 354, 1338; *L.*, pp. 79, 147, 166, 177, 224, 247; *T.*, pp. 81, 445, 447; *O. Chs.* 1-10.

13. Controlling insects (a) Relation of crop rotation to insect control; (b) mechanical means of controlling insects; (c) the use of trap crops, poisoned baits and repellents; (d) chewing insects as compared to sucking insects; (e) formulas for spray mixtures; (f) spraying and dusting for insect control; (g) insects attacking vegetables; (h) life cycle of insects.

References: *L. Ch.* 12; *Md. Bul.* 34; *F. B.* 1061, 1322, 232, 837, 721, 668, 1275, 1407, 762, 1007, 1371, 1282, 959, 1193, 433, 1394, 289, 434, 1431, 937, 1338, 829, 934; *Spraying charts from spray companies*; *T. Ch.* 13.

14. Controlling diseases (a) Relation of crop rotation to disease control; (b) life cycle of fungous diseases; (c) diseases attacking vegetables; (d) formulas for spray mixtures; (e) spraying for disease controls.

References: *L. Ch.* 12; *S.*; *T. Ch.* 13; *Md. Bul.* 34; *F. B.* 1351, 1060, 434, 289, 254, 937, 934, 1418; *Spray charts from spray companies*.

15. Harvesting (a) Relation of time of harvesting to purpose of vegetable; (b) relation of time of harvesting to market and market conditions; (c) relation of time of harvesting to the vegetable to be harvested; (d) relation of time of harvesting to the conditions of the grower; (e) methods of harvesting.

References: *T. Ch.* 14; *Md. Bul.* 34; *L.*, pp. 178, 150, 168, 170, 178, 102, 192, 200, 214, 256; *F. B.* 829, 1269, 354, 1338, 1431, 434, 1394, 1189, 1145, 1423, 1291, 1255, 289, 1320, 433, 937, 232, 434.

16. Marketing (a) Care of vegetables between harvesting and marketing; (b) packing and grading; (c) packing sheds; (d) preparation of vegetables for market; (e) relation of market to method of packing; (f) methods of transporting vegetables compared; (g) methods of disposing of the product.

References: *L. Ch.* 29; *Md. Buls.* 34 and 280; *F. B.* 1338, 1320, 1145, 1423, 1189, 1394, 289, 1233, 1269, 829; *T. Ch.* 14.

17. Saving seed (a) Factors essential to the production of good seed; (b) harvesting the seed; (c) cleaning and curing seeds; (d) storing seeds; (e) home growing vs. buying; from a commercial firm.

References: *L. Ch.* 4; *F. B.* 434, 1253, 884, 1390, 1269; *T. Ch.* 6.

18. Storing (a) Conditions essential to successful storage; (b) relation of the vegetable to the type of storage; (c) vegetable storage houses; (d) storage for home use; (e) preparation of vegetables for storage.

References: *T. Ch.* 15; *L. Ch.* 30; *Md. Bul.* 34; *F. B.* 879, 1269, 937, 434, 1423; *U. Me.* 120.

D. LEGEND TO REFERENCES

- W.—Watts "Vegetable Growing Projects." Macmillan Co., New York.
 T.—Thompson "Vegetable Crops." McGraw Hill, N. Y.
 Md. Bul.—University of Maryland Extension Service, College Park, Maryland.
 L.—Lloyd "Productive Vegetable Growing." J. B. Lippincott Co., Philadelphia.
 F. B.—Farmers' Bulletin. U. S. D. A., Washington, D. C.
 W. E.—Weed and Emerson "The School Garden Book." Scribners Sons, New York.
 S.—Stevens, "Diseases of Economic Plants."
 U. Me.—University of Maine Agricultural Extension Service, No. 120, "Vegetable Storage on the Farm," Orono, Maine.
 Mich. Bul.—Michigan Agricultural College Extension Service, "Hot Beds and Cold Frames," East Lansing, Michigan.
 O.—Okane "Injurious Insects." Macmillan Co., New York.

E. THROUGH TYPICAL SUPERVISED PRACTICAL WORK

1. The care and management of a home garden
2. Producing vegetables from at least one-half an acre
3. Producing two or less vegetables from one acre of land

F. THROUGH LABORATORY EXERCISES, DEMONSTRATIONS, PRACTICUMS AND FIELD TRIPS

1. Identifying vegetable varieties
2. Buying seed
3. Testing seed
4. Transplanting plants
5. Preparing a hot bed or cold frame
6. Planting seed
7. Cultivating
8. Thinning
9. Preparing a seed bed
10. Harvesting
11. Grading, cleaning and packing
12. Spraying for insects or diseases
13. Dusting for insects or diseases
14. Preparing spray material
15. Pruning
16. Weeding
17. Keeping records and accounts
18. Preparing and exhibiting
19. Storing vegetable

G. THROUGH CORRELATED FARM SHOP WORK

1. Constructing vegetable flats, markers, etc.
2. Constructing a hot bed or cold frame
3. Constructing a germination box
4. Fencing around a garden
5. Getting machinery and implements in readiness for vegetable work

III Vegetable Gardening Equipment**A. NECESSARY**

1. Truog soil tester and chemicals
2. Soil thermometer
3. Soil samples
4. Soil tubes
5. Samples of garden seed
6. Germination boxes
7. Fertilizer and lime samples
8. Insecticide and fungicide samples
9. Spraying charts—Corona Chem. Co., Milwaukee, Wis., and Sherwin Williams, Chicago, Illinois.
10. Vegetable chart—Salzer Seed Co., LaCrosse, Wisconsin.

B. DESIRABLE

1. Film slide projector
2. Sets of film slides
3. Charts 1-13—Composition of feed materials, States Relation Service, U. S. D. A., Washington, D. C.
4. Garden tools—See U. of Md. Bul. No. 35.
5. Lumber, glass, and sash
6. Magazine—"Better Homes and Gardens," Des Moines, Iowa.
7. Catalogues from such companies as: Bolgiano Seed Co., Baltimore, Griffith and Turner, Baltimore, W. A. Burpee, Philadelphia.

V Evidences of the Achievement of Goals

- A. HOME VEGETABLE GARDENS BEING GROWN, AS AN AVOCATION, BY ALL FORMER PUPILS WHO ARE SO SITUATED AS TO MAKE VEGETABLE GARDENING FEASIBLE
- B. FORMER PUPILS ESTABLISHED AS COMMERCIAL GARDENERS
- C. FORMER PUPILS DEMONSTRATING AN ACTIVE INTEREST IN THE MARKETING OF VEGETABLES
- D. THE PROFITABLE GROWING AND MARKETING OF TRUCK
- E. THE EFFICIENT DISPOSAL OF SURPLUS VEGETABLES

HORTICULTURAL ENTERPRISE**I Goals of Achievement**

- A. Ability to economically operate and manage orchard enterprises
- B. Habits of self-reliance in securing and applying data to actual situations
- C. A knowledge of available information on horticulture
- D. Skill in individual performances
- E. Development of interests in and appreciations for horticulture
- F. A maximum of pupil participation in all activities
- G. The development of ability to dispose of fruit efficiently

II Activities Through Which The Goals May Be Achieved

A. THE PRELIMINARY STUDY

1. The relation of horticulture to other community types of farming
2. The suitability of horticulture for classroom instruction
3. The importance of horticulture as a source of income
4. Climate and soil adaptations to horticulture
5. Job analysis of horticultural enterprise

B. BY LISTING THE PRINCIPAL JOBS

1. Selecting orchard land
2. Selecting varieties
3. Buying nursery stock
4. Laying out the orchard, and preparing the ground
5. Planting the trees
6. Cropping the non-bearing orchard
7. Cultivating the orchard
8. Fertilizing the orchard
9. Selecting of cover crops
10. Pruning trees
11. Spraying fruit trees, and thinning fruit
12. Renovating orchards
13. Picking and handling fruit
14. Grading, packing, and storing fruit
15. Marketing fruit
16. Studying orchard economics

C. CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|--|
| 1. Selecting orchard land..... | (a) Exposure; (b) soil and climate; (c) water and air drainage; (d) windbreaks; (e) accessibility to market; (f) cost. |
| <i>References: Go., pp. 218-281; S. Ch. 11; G. pp. 13-18; N. H. Ex. Bul. 1; Wis. Bul. 201; O. Bul. 137; W. Va. Bul. 136.</i> | |
| 2. Selecting varieties..... | (a) Varieties that are adaptable to local conditions; (b) self-fertile and self-sterile varieties; (c) market demands. |
| <i>References: G., pp. 31-33; S. Ch. 11; F. B. 918; W. Va. Bul. 136; C. Ext. 75; Go., pp. 282-355.</i> | |
| 3. Buying nursery stock..... | (a) Age to buy; (b) size or grade; (c) height of head; (d) when and where to order. |
| <i>References: Go., pp. 1-73; S. Ch. 11; G., pp. 35-36; Wis. Bul. 201; C. Ext. 75.</i> | |
| 4. Laying out the orchard and preparing the ground.. | (a) Methods of laying out; (b) distances between trees and rows; (c) use of fillers; (d) when to remove fillers; (e) preparing ground. |
| <i>References: S. Ch. 4; N. H. Bul. 1; Mich. Bul. 262; W. Va. Bul. 136.</i> | |

5. Planting trees (a) Preparation of land; (b) when to plant; (c) how to make holes; (d) use of planting and measuring boards; (e) pruning; (f) heeling in.
References: S. Ch. 4; G., pp. 37-40; Md. Bul. 48, 178, 207; F. B. 1001.
6. Cropping the non-bearing orchard (a) Advantages; (b) suitable crops; (c) rotations.
References: S. Ch. 5; G., p. 45; W. Va. Bul. 136; C. Ext. 75.
7. Cultivating the orchard (a) Clean culture vs. sod culture; (b) implements; (c) time and frequency; (d) profitable practices.
References: S. Chs. 6 and 7; F. B. 1001; G., pp. 40-45; F. B. 491; C. Ext. 66, 75, 114; Wis. Bul. 207.
8. Fertilizing the orchard (a) Advantages and disadvantages; (b) time and rate of application; (c) fertilizing materials; (d) methods of application; (e) value of farm manures; (f) cost.
References: Go., pp. 179-217; G., pp. 45-51; S. Ch. 8; Pa. Bul. 121; Wis. Bul. 207.
9. Selecting of cover crops (a) Value of green manure crops; (b) other orchard crops; (c) when to plant and plow under; (d) cost; (e) rate of seeding.
References: C. Ext. 66, 75, 114; S. Ch. 9; G., pp. 43-45; O. Bul. 137.
10. Pruning trees (a) Advantages; (b) technique; (c) tools; (d) principles of pruning; (e) amount and time of pruning; (f) height of head.
References: C. Ext. 66, 75, 114; F. B., 181, 1001; S. Ch. 10; G., pp. 53-60; Go., pp. 74-101.
11. Renovating orchards (a) Purpose—advantages; (b) budding and grafting; (c) methods; (d) condition of orchard—age.
References: S. Ch. 16; F. B. 1284; G., pp. 156-176; N. J. Ext. Bul. 39.
12. Spraying fruit trees and thinning fruit (a) Insects and insecticides; (b) diseases and fungicides; (c) home-mixing vs. commercial; (d) spraying equipment; (e) the spray calendar; (f) thinning fruit. (See Ore. Cir. 76, Col. Cir. 170, W. Va. Cir. 162.)
References: F. B. 994, 938, 1478, 1380, 1270, 1120, 1248; S. Ch. 11, 12, 13, 14, 15; G., pp. 123-131; Md. Spray Calendar.
13. Picking and handling fruit. (a) Equipment; (b) when and how to pick.
References: S. Ch. 17; F. B. 113, 1360; G., pp. 132-135; U. S. D. A. 1448.

14. Grading, packing, and storing (a) Grading standards and laws; (b) methods; (c) equipment; (d) various packs and advantages; (e) storing.
References: F. B. 1080, 1457, 1266; S. Ch. 19; W. Va. Bul. 139; N. J. Bul. 284; C. Ext. Bul. 126; Go., pp. 356-369.
15. Marketing fruit..... (a) Market trends; (b) fancy markets; (c) quality; (d) cooperative marketing; (e) other methods of selling; (f) advertising.
References: Wash. Ext. Bul. 132; Md Bul. 280; F. B. 1196; S. Ch. 20; J. Ch. 7; U. S. D. A. Buls. 935, 1415, 1416.
16. Studying orchard economics.
See U. S. D. A. Buls. 446, 500, 518, 614, 636, 851.

NOTE: In some communities small fruits should be studied from the standpoint of jobs 1-16. See Sears "Productive Small Fruit Culture." Lippincott Co., Philadelphia.

D. READING

1. Legend to instructional material

a. Books

- Go.—Gourley "Test Book of Pomology." Macmillan Co., New York.
 G.—Green "Popular Fruit Growing." Webb Pub. Co., St. Paul, Minnesota.
 J.—Jesness "Cooperative Marketing of Farm Products." Lippincott Co., Philadelphia.
 S.—Sears "Productive Orcharding." Lippincott Co., Philadelphia.

b. Bulletins

- Ore.—Oregon Agricultural College, Corvallis, Oregon.
 C.—Cornell University, Ithaca, N. Y.
 F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.
 Md. Ex. Bul.—University of Maryland, College Park, Md.
 Wis. Bul.—University of Wisconsin, Madison, Wis.
 Ohio Bul.—Ohio University, Columbus, Ohio.
 W. Va.—West Virginia University, Morgantown, W. Va.
 Col.—Colorado Agr. College, Fort Collins, Colorado.
 N. J.—New Jersey Bulletin, Rutgers Agr. College, New Brunswick, N. J.

2. Additional references for more extensive reading.

a. Technical books

- Horticulture, Smith Hammond & Co., Atlanta, Ga.
 Berry "Farm Woodlands." World Book Co., New York.

- Cheyney and Wentling "The Farm Woodlot." Macmillan Co., New York.
- Chandler "Fruit Growing." Houghton, Mifflin Co., New York.
- Bailey "Cyclopedia of Horticulture." Macmillan Co., New York.
- Bailey "Principles of Fruit Growing." Macmillan Co., New York.
- Card "Bush Fruits." Macmillan Co., New York.
- Fraser "American Fruits." Orange, Judd Co., New York.
- Fletcher "Strawberry Growing." Macmillan Co., New York.
- Lloyd "Studies in Horticulture." Rand, McNally Co., New York.
- Washburn "Injurious Insects and Useful Birds." Lippincott Co., Philadelphia.
- Hedrick "Manual of American Grape Growing." Macmillan Co., New York.
- Gardner, Bradford and Hooker "Fundamentals of Fruit Production." McGraw Hill, New York.

b. Popular books

- Burrett "Apple Growing." Macmillan Co., New York.
- Hedrick Series—Apples, Pears, Peaches, Plums, Cherries, Small Fruits. L. B. Lyon Co., Albany, N. Y.
- Gould "Peach Growing." Macmillan Co., New York.

c. Bulletins and circulars

- Address Superintendent of Documents, Gov. Printing Office, Washington, D. C.
- Agricultural Instruction Division, U. S. D. A., Washington, D. C. (for complete lists of U. S. D. A. books, bulletins, and circulars)
- University of Maryland, College Park, Md. (for a list of Maryland bulletins and circulars available.)

d. Magazines

- "The American Fruit Grower." 53 W. Jackson Blvd., Chicago, Ill.
- "Better Fruit." Portland, Ore.
- "Fruits and Gardens." Grand Rapids, Mich.
- "The Forestry News Digest." American Tree Ass'n, Washington, D. C.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Planting and care of a two acre orchard
2. Management of a one acre bearing orchard
3. Renovating a one acre orchard
4. Planting and care of one-half acre strawberries, raspberries, or blackberries
5. Harvesting, grading, packing and marketing fruit from the home orchard

F. LABORATORY EXERCISES, DEMONSTRATIONS, OBSERVATIONS AND FIELD TRIPS

1. Selecting orchard land
2. Statistical survey of weather charts
3. Laying out a home orchard
4. Heeling in young trees
5. Heading young trees
6. Calculating orchard fertilizer analyses and formulae
7. Planting fruit trees
8. Identification of fruit varieties
9. Pruning fruit trees—limited number
10. Budding and grafting trees, including making of grafting wax and waxed string
11. Mixing a spray formula
12. Operating a power spray machine
13. Making a standard fruit pack
14. Heading a barrel
15. Exhibiting and marketing fruit
16. Keeping records
17. Protecting trees from mice, rats, rabbits, etc.

G. CORRELATED FARM SHOP WORK

1. Making a fruit ladder
2. Repairing equipment
3. Constructing a furnace for heating spray mixtures
4. Constructing a small grading and packing house—See F. B. 1204
5. Assembling barrels and boxes

III Equipment and Materials

A. NECESSARY

1. Pruning shears and saws, budding knives, and grafting chisels
2. Fruit score cards

B. DESIRABLE

1. Fruit disease and insect collections
2. Maps and slides
3. Sprayers and dusters
4. Chemicals for preparing spray materials
5. Charts—Spraying guides—Sherwin Williams Co., Philadelphia, and Corona Chemical Co., Milwaukee, Wis.
6. Catalogues from Harrison Bros., Berlin, Md., and local nurseries

IV Evidences of the Achievement of Goals

- A. THE COMPLETING OF THE SUPERVISED PRACTICAL WORK AS INDICATED HEREIN
- B. FORMER MEMBERS OF GROUP MANAGING ORCHARDS
- C. FORMER MEMBERS OF GROUP ESTABLISHED IN HOME OR COMMERCIAL FRUIT PRODUCTION ENTERPRISES
- D. PUPILS CARING FOR AN ORCHARD OF ONE OR MORE ACRES
- E. FORMER PUPILS ACTIVELY ENGAGED IN THE COOPERATIVE MARKETING OF FRUIT

LANDSCAPE GARDENING ENTERPRISE

I Goals of Achievement

- A. An appreciation of the possibilities in the beautifying of home and school grounds
- B. Ability to plan for the beautification of home and school grounds
- C. A knowledge of the plants especially adapted locally

II Activities Through Which Goals May Be Achieved

A. THE PRELIMINARY STUDY

1. Need for home and school ground beautification as shown by observations made locally
2. The results of correct plantings as shown by observing well planted grounds
3. Factors involved in the beautification of grounds

B. BY LISTING THE PRINCIPAL JOBS

1. Planning
2. Locating the dwelling
3. Locating walks, drives, and entrances
4. Constructing walks, drives, and entrances
5. Grading of lawns
6. Seeding and sodding
7. Planting of trees and shrubs
8. Planting of perennials and roses
9. Planting of annual flowers

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|---|---|
| 1. Planning | (a) Principles involved in grading and planting.
<i>References: Md. Ext. 10; G., pp. 9-18; Tenn. Pub. 32.</i> |
| 2. Locating the dwelling..... | (a) Exposure; (b) contour of grounds.
<i>References: G., pp. 19-28.</i> |
| 3. Locating walks, drives, and entrances | (a) Principles to be observed.
<i>References: G., pp. 29-46.</i> |
| 4. Constructing walks, drives, and entrances..... | (a) Materials to be used; (b) methods of constructing.
<i>References: G., pp. 46-64.</i> |
| 5. Grading of lawns..... | (a) Principles to be observed; (b) equipment needed; (c) methods; (d) upkeep.
<i>References: G., pp. 65-70.</i> |
| 6. Seeding and sodding..... | (a) Comparison as to local adaptations.
<i>References: G., pp. 71-78.</i> |
| 7. Planting of trees and shrubs | (a) Plans of planting; (b) securing; (c) methods of planting.
<i>References: G., pp. 78-122, 231-273; Mich. 281; F. B. 1178, 1208, 1209.</i> |

8. Planting of perennials and roses (a) Plan; (b) securing; (c) planting.
References: *G.*, pp. 197-220, 231-273; *F. B.* 1087.
9. Planting of annuals..... (a) Plan; (b) securing seed or plants;
(c) methods of planting.
References: *G.*, pp. 123-170, 231-273; *F. B.* 1171; *Md. Ext. Bul.* 23.

D. READINGS

1. Legend to instructional material
 - G.—Gridland "Practical Landscape Gardening." A. T. DeLa-Mare Co., New York.
 - F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.
 - Tenn.—University of Tennessee, Knoxville, Tenn.
 - Mich.—Michigan Experiment Station, East Lansing, Mich.
 - Md. Ext. Bul.—Extension Service, University of Maryland, College Park, Md.
2. References for more extensive reading
 - a. Books
 - Ely "The Practical Flower Garden." Macmillan Co., New York.
 - Maynard "Landscape Gardening." John Wiley & Sons, New York.
 - Waugh "Landscape Gardening." Orange, Judd Co., New York.
 - b. Bulletins
 - U. S. D. A., Washington, D. C.
 - c. Magazines
 - House and Garden
 - Country Life in America
 - Better Homes and Gardens, Des Moines, Iowa.

E. TYPICAL CORRELATED SUPERVISED PRACTICAL WORK

1. Improving of home grounds
2. Improving of school grounds

F. CORRELATED LABORATORY EXERCISES, PRACTICUMS, DEMONSTRATIONS, AND FIELD TRIPS

1. Visit home grounds, showing correct and incorrect plantings
2. Draw plans of the home and school grounds, indicating thereon the additional plantings needed, as well as plants which should be removed, if any
3. Propagate shrubs by the different methods
4. Plant seed, bulbs, shrubs and trees on home and school grounds
5. Prepare seed bed and sow lawn
6. Prune rose bushes and shrubs
7. Prepare fungicides and insecticides
8. Treat roses, flowers and shrubs for insects and diseases

G. CORRELATED FARM SHOP

1. Construct trellises
2. Construct porch boxes
3. Construct lawn roller
4. Sharpen lawn mowers

II Equipment and Materials

- A. PRUNING KNIVES AND SHEARS
- B. MATERIALS FOR PREPARING INSECTICIDES AND FUNGICIDES
- C. SPRAYING CHARTS—Kentucky Tobacco Products Co., Louisville, Ky.
Sherwin Williams Company, Philadelphia, Pa.

V Evidences of Achievement

- A. SCHOOL GROUNDS BEAUTIFIED ACCORDING TO CORRECT METHODS
- B. AN APPRECIATION FOR CORRECT PLANTINGS DEMONSTRATED ON THE HOME GROUNDS OF PUPILS

PLANT ENTERPRISE MATERIALS AND EXHIBITS OTHER THAN THOSE LISTED IN FARM ENTERPRISE OUTLINES

1. Booklets

- a. Potash Importing Corporation of America, 10 Bridge Street, New York.

2. Bulletins

- a. Collections of Crop Bulletins and Charts. International Harvester Company, Chicago, Ill.
- b. Fertilizer Bulletins. The National Fertilizer Association, Washington, D. C.; The American Agricultural Chemical Society, Fidelity Building, Baltimore, Md.
- c. Quarterly. Agricultural Liming Materials, State Lime Department, College Park, Md.

3. Charts

- a. National Lime Association, Washington, D. C.
- b. Potato Disease Charts. Ohio State Agricultural Experiment Station, Wooster, Ohio.
- c. Spraying. The Matthews-Northrup Works, New York.
- d. Standard Seed Potatoes. University of Wisconsin, Madison, Wis.

4. Exhibits

- a. Corn Products Refining Company, Edgewater, N. J.
- b. Morris & Co., Chicago, Ill.—Set of fertilizer samples.
- c. Seed Exhibit and Farm Guide—Pine Tree Brand Seed. Dickinson Co., 35th Street and Colorado Avenue, Chicago, Ill.

5. Guide

- a. Seed. O. M. Scott & Sons Co., Maryville, Ohio.

6. Manual

- a. Atlas Powder Company, Wilmington, Del.

7. References on Soils

- Hinkle—Fertility and Crop Production. S. F. Hinkle, Sandusky, Ohio.
- Lyon—Soils and Fertilizers. Macmillan Co., New York.
- Lyon, Fippin & Buckman—Soils, Their Properties and Management. Macmillan Co., New York.
- Miller—The Soil and Its Management. Ginn & Co., New York.
- Mosier and Gustafson—Soil Physics and Management. Lippincott Co., Philadelphia.
- Taylor—Soil Culture and Modern Farm Methods. Deere & Co., Moline, Illinois.
- Weir—Productive Soils—Abridged Edition. Lippincott Co., Philadelphia.
- Soil Survey Bulletins. U. S. Bureau of Soils, Washington, D. C.

DAIRY ENTERPRISE

I Goals of Achievement

- A. Ability to successfully manage a small dairy herd
- B. Habits of accuracy and self-reliance in securing and applying data to actual situations in dairying
- C. A working knowledge of the information available on dairying
- D. Skill in individual performances of standard practices
- E. Right attitudes toward the different phases of correlated instruction
- F. The development of genuine interest in and appreciations for the dairy industry
- H. A maximum pupil participation in all activities undertaken
- I. Ability to dispose of milk and milk products, economically

II Activities Through Which Goals May Be Achieved

A. THROUGH PRELIMINARY STUDY

1. The adaptability of the local community to dairying
2. The experience of the individuals enrolled in the group
3. The opportunity for practical work in dairying by boys enrolled
4. Analysis of the job of dairying

B. BY LISTING THE PRINCIPAL JOBS

1. Studying types and breeds of dairy cattle
2. Selecting the breeds best adapted to local conditions
3. Building up the dairy herd
4. Caring for and management of the dairy calf
5. Selecting a location for the dairy barn
6. Constructing the dairy barn
7. Preparing and feeding rations to dairy cows
8. Keeping records and accounts on feeding, production and breeding
9. Milking
10. Testing milk, skim milk, and cream for butter fat
11. Caring for milk before marketing
12. Marketing of milk
13. Caring for and management of the herd
14. Fitting for show purposes
15. Planning crop rotations most economical for the dairy business

C. THROUGH CLASSROOM INSTRUCTION

*Job**Teaching Content*

1. Studying type and breeds of dairy cattle.....(a) Dairy type; (b) characteristics of each breed; (c) the score card as a means of study; (d) comparative judging of dairy cattle.

References: H. Ch. 10; P. Chs. 30, 35; Wa. Ch. 6; Pl. Chs. 25, 27; F. B. 1443; M. Ext. Bul. 92; Clem. Ext. Bul. 78; E. W. Ch. 2; B. S., pp. 159-168; U. S. D. A.; Misc. Cir. 99.

2. Selecting the breed best adapted to local conditions.(a) Comparison of the different breeds as to local adaptation; (b) availability of different breeds; (c) capital needed; (d) market requirements.

References: Y. N. Ch. 7; H. Ch. 9; Pb. Ch. 31; Wa. Chs. 8-11; Pl. Ch. 28; R. Chs. 1-17; F. B. 1443.

3. Building up the herd.....(a) Methods; (b) selection of individuals; (c) pedigrees; (d) registering of animals.
References: H. Ch. 3; Y. N. Chs. 2-6; E. W. Ch. 3; Wa. Ch. 24; L. Chs. 2, 3, 7, 8, 9, 19, 22.
4. Caring for and management of dairy calf.....(a) Feeding—whole milk, skim milk, milk substitutes — sanitary practices; (b) methods of weaning; (c) kind of pasture—bluegrass, alfalfa, timothy, etc.—characteristics, adaptability, and food value of each; (d) amount of grain supplements; (e) protection from flies—sprays and dips, sanitary stables; (f) water and salt requirements.
References: C. Bul. No. 73; F. B. No. 1336, 993; O. Bul. No. 289; M. Bul. No. 215; V. P. I. Bul. No. 219; V. P. I. Bul. No. 225; Mo. Cir. No. 116; I. Cir. No. 91; Wa.; E. W. Ch. 4; Y. N. Chs. 11, 12.
5. Selecting a location for dairy barn.....(a) Factors affecting the location; (b) observation of typical locations to be found in the community; (c) construction.
References: F. B. Nos. 1342 and 214; Wa. Ch. 21; L. Ch. 13; Y. N. Ch. 18.
6. Constructing the dairy barn(a) Comparison of types adapted to local conditions; (b) factors involved in construction—planning, building materials, equipment, labor, capital.
References: F. B. Nos. 1342, 743 and 214; E. W. Ch. 6; Wa. Ch. 21; Clem. Ext. Bul. 62.
7. Preparing and feeding rations to dairy cows.....(a) Necessity for feeding a balanced ration; (b) types of rations with purposes of each; (c) comparison of different rations adapted locally; (d) methods of feeding different rations; (e) balancing rations; (f) commercial feeds.
References: H. M. Chs. 7, 20 and 21; E. W. Ch. 5; H. M. Chs. 20, 21, 22; Wa. Ch.. 23; H. Ch. 11; L. Ch. 5; B. S., pp. 184-194.
8. Keeping records and accounts(a) Necessity for methods of keeping records; (b) methods.
References: H. Ch. 13; C. L. M.; L. Chs. 3, 14.
9. Milking(a) Methods; (b) sanitation; (c) utensils; (d) cleanliness of cows and utensils; (e) sources of contamination.
References: F. B. 602, 572, 1315, 1182; H. Ch. 13; Wa. Ch. 25; L. Ch. 6; E. W. Ch. 8; Y. N. Ch. 7.

10. Testing milk, skim milk, and cream for butter fat..... (a) Necessity for and value of testing; (b) methods of testing cream and milk; (c) the work of Cow Testing Associations.

References: W.; H. Ch. 13; Wa. Ch. 28; F. B. 1446; B. S., pp. 169-184; Y. N. Ch. 4.

11. Caring for milk before marketing (a) Cooling; (b) kind and care of utensils and other equipment; (c) farm dairy houses.

References: Wa. Chs. 26 and 27.

12. Marketing of milk..... (a) Markets available—comparison of prices in different markets, transportation; (b) market—whole milk, cream, butter—comparative profits.

References: H. Ch. 13; Y. N. Ch. 7; Wa. Chs. 30-40; E. W. Ch. 12.

13. Caring for and management of the herd..... (a) Diseases and their control; (b) handling of the herd; (c) care of cows at time of breeding, after breeding, and before and after freshening; (d) care and management of bull.

References: F. B. 666, 790, 1949, 1412, 1069, 1422, 993; Wa. Chs. 19, 20, 22; C. Ch. 27, 30; H. Ch. 12; Y. N. Ch. 14.

14. Fitting for show purposes... (a) Values of showing; (b) methods; (c) fitting animals; (d) special feeding and care.

References: Y. N. Ch. 17; *Holstein Friesian*; *Calf Club Manual and Score Card*, Chicago, Ill.; Pa. Ext. Cir. 52.

15. Planning crop rotations most economical for the dairy business (a) Concentrate, silage, and legume crops adapted to the community; growing of concentrate, advantage of producing silage, advantage of producing leguminous roughages.

References: E. W. Chs. 10, 13; F. B. 782; Wa. Chs. 2, 3; L. Ch. 12; B. S. Ch. 4.

D. LEGEND TO INSTRUCTIONAL MATERIAL

Y. N.—Yapp and Nevens "Dairy Cattle." John Wiley & Sons, New York.

C.—Craig "Common Diseases of Farm Animals."

H.—Harper "Animal Husbandry for Schools" (Revised). Macmillan Company, New York.

P.—Plumb "Types and Breeds of Farm Animals" (Revised). Ginn & Co., New York.

Pl.—Plumb "Judging Farm Animals." Orange, Judd Company, New York.

H. M.—Henry and Morrison "Feeds and Feeding" (Abridged). Henry-Morrison Company, Madison, Wis.

- Clem. Ext.—Clemson Agr. College, Clemson, S. C.
 S.—Shaver "Management and Feeding of Cattle."
 W.—Wool "Productive Feeds of Farm Animals." Webb Publishing Company, St. Paul, Minn.
 Pa. Ext. Cir.—Pennsylvania State College, State College, Pa.
 Wg.—Wing "Milk and Milk Products." Macmillan Company, New York.
 Wn.—Warren "Farm Management." Macmillan Company, New York.
 E. W.—Eckles and Warren "Dairy Farming." Macmillan Company, New York.
 Wa.—Washburn "Productive Dairying." J. B. Lippincott Company, Philadelphia, Pa.
 F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.
 C. Bul.—Cornell Experiment Station, Ithaca, N. Y.
 O. Bul.—Ohio Experiment Station, Columbus, Ohio.
 M. Bul.—Minnesota Experiment Station, St. Paul, Minn.
 V. P. I.—Virginia Polytechnic Institute, Blacksburg, Va.
 Mo.—Missouri Experiment Station, Columbia, Mo.
 I.—Iowa Experiment Station, Ames, Iowa.
 L.—Ladd "Dairy Farming Projects." Macmillan Co., New York.
 B. S.—Bray and Schmidt "Practical Activities in Animal Husbandry." Century Co., New York.
 S.—Stocking "Manual of Milk Products." Macmillan Co., New York.
 E.—Eckles "Dairy Cattle and Milk Production." Macmillan Co., New York.
 R.—Ross "The Care and Handling of Milk." Orange, Judd Co., New York.

E. THROUGH TYPICAL SUPERVISED PRACTICAL WORK IN DAIRYING,
 SUCH AS

1. Care and management of a dairy herd of from 10-15 cows
2. Obtaining and raising of a pure bred dairy calf
3. Testing and keeping daily records on a herd of 10 cows

F. THROUGH CORRELATED LABORATORY EXERCISES, DEMONSTRATIONS,
 PRACTICUMS, AND FIELD TRIPS,

1. Scoring and judging dairy cows from the utility standpoint
2. Identifying major dairy breeds
3. Milking by hand and with machine
4. Testing milk, whole milk, and cream for butterfat
5. Preparing and feeding a balanced ration
6. Keeping feed, breeding and milk records on a small dairy herd
7. Keeping a dairy barn sanitary
8. Clipping dairy cows
9. Selecting a pure bred calf
10. Dehorning a calf
11. Training a calf to lead
12. Fitting for show and exhibiting a calf
13. Caring for a dairy calf
14. Keeping records on a dairy calf
15. Studying the physical properties of feeds
16. Observing the pasturization of milk, and treatment for diseases

G. THROUGH CORRELATED FARM SHOP WORK

1. Constructing a milking stool and other conveniences
2. Constructing a stanchion
3. Laying concrete walks about the dairy barn
4. Constructing concrete manure pits, drinking troughs, milk houses, etc.
5. Repairing equipment
6. Drawing tentative plans for a dairy barn

III Dairy Equipment and Materials

A. NECESSARY

1. Babcock milk tester, complete
2. Chemicals for making tests
3. Bottles or jars in which to keep milk and cream samples
4. Milk scales—60 pounds
5. Score cards and milk charts
6. Samples of different dairy feeds
7. Lactometer

B. DESIRABLE

1. Veterinary thermometer
2. Acidometer
3. Stereoptican
4. Sets of slides
5. Charts—Empire Milking Machine Co., Bloomfield, N. J.
Separator diagram, and charts. DeLaval Separator Co.,
New York, and Sharples Sep. Co., West Chester, Pa.
Food Source Map. Armour & Co., Chicago, Ill., and
Carnation Stock Farms, Oconomowoc, Wis.
6. Magazines—Hoard's Dairyman, Fort Atkinson, Wis.
The Dairy Farmer, Des Moines, Iowa.
7. Breed journals and charts—For addresses see Storm and Davis,
page 417, or Schmidt, page 248.
8. Manual—Cow Testing Association Manual, Holstein Fresian As-
sociation, 230 Ohio Street, Chicago, Ill.
9. Building plans—James Mfg. Company, Elmira, N. Y.
The Loudon Mfg. Company, Fairfield, Iowa.
Portland Cement Ass'n., Philadelphia, Pa.
10. Miscellaneous equipment.

IV Evidences of the Achievement of Goals

- A. FORMER PUPILS ESTABLISHED ON DAIRY FARMS, OR AS DAIRY FARM-
ERS
- B. THE SATISFACTORY COMPLETION OF DAIRY PROJECTS, OR OTHER SU-
PERVISED PRACTICAL WORK IN DAIRYING
- C. FORMER PUPILS ASSISTING IN ORGANIZING AND MANAGING OF COW
TESTING ASSOCIATIONS
- D. ABILITY TO MAKE A PROFIT EQUAL TO, OR MORE THAN, THE AVERAGE
DAIRYMAN OF THE COMMUNITY
- E. PRODUCT BEING DISPOSED OF IN A SATISFACTORY AND ECONOMICAL
MANNER

BEEF CATTLE ENTERPRISE

I Goals of Achievement

- A. Ability to determine whether or not the raising or feeding of beef cattle locally, is profitable
- B. A knowledge of the fundamental principles involved in the feeding of beef cattle

II Activities Through Which Goals May Be Achieved

A. THROUGH PRELIMINARY STUDY

1. The place of beef cattle on the farm
2. The adaptability of the local community to beef cattle raising, and feeding.
3. The opportunity for supervised practical work
4. Analysis of the jobs connected with the raising and feeding of beef cattle.

B. BY LISTING THE PRINCIPAL JOBS

1. Studying of the principal breeds of beef cattle
2. Judging beef cattle
3. Selecting feeder cattle
4. Establishing and managing of beef breeding herds
5. Feeding the beef breeding herd and fattening steers
6. Keeping records and accounts on feeding and production
7. Marketing of beef cattle
8. Fitting and showing beef cattle

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|---|--|
| 1. Studying the principal breeds of beef cattle..... | (a) Type; (b) distinguishing characteristics of principal breeds; (c) adaptability to local condition.
<i>References: H., pp. 235-250; P., pp. 217-232; S., pp. 305-316.</i> |
| 2. Judging beef cattle..... | (a) General characteristics; (b) comparative judging.
<i>References: H., pp. 251-260; P., pp. 233-244,</i> |
| 3. Selecting feeder cattle..... | (a) Age and weight; (b) form; (c) constitution; (d) breeding; (e) local market requirements.
<i>References: S., pp. 297-304; S., pp. 305-329; local farmers; V., pp. 110-119.</i> |
| 4. Establishing and managing the beef breeding herd..... | (a) Selection of individuals (b) management.
<i>References: H., pp. 277-288; S., pp. 317.</i> |
| 5. Feeding the beef breeding herd and fattening steers..... | (a) Selection of feeds; (b) compounding rations; (c) methods of feeding.
<i>References: H. M.; H., pp. 289-296; P., pp. 84-124, 244-245.</i> |

6. Keeping records and accounts on feeding and production (a) Necessity for; (b) content; (c) methods.

References: *W.*, pp. 5-226; *S.*, pp. 343-349; *P. Bul.* 281.

7. Marketing beef cattle..... (a) Condition of cattle; (b) methods; (c) available markets.

References: *O. Bul.* 375; *H.*, p. 297; *T. Chs.* 2, 3, 5, 12, 15, 18, 26, 29; *S.*, pp. 350-363; *U. S. D. A.* 1464.

8. Fitting and showing beef cattle (a) Selecting, feeding and training the show herd; (b) preparing for the show; (c) conduct in the show ring.

References: *S.*, pp. 356-363.

D. READINGS

1. Legend to instructional material
 - H.—Harper—Annual Husbandry for Schools. Macmillan Company, New York.
 - P.—Plumb—A Study of Farm Animals. Webb Publishing Company, Minneapolis, Minn.
 - W.—Woll—Productive Feeding of Farm Animals. Lippincott Company, Philadelphia, Pa.
 - T.—Tomhave—Meat and Meat Products. Lippincott Company, Philadelphia, Pa.
 - S.—Smith—Livestock and Poultry. Smith Publishing Company, Atlanta, Ga.
 - V.—Vaughan—Types and Market Classes of Livestock. R. G. Adams Company, Columbus, Ohio.
 - H. M.—Henry & Morrison—Abridged. Henry-Morrison Company, Madison, Wisc.
 - Md.—Maryland Extension Service and Experiment Station, College Park, Md.
 - O. Bul.—Ohio Experiment Station and Extension Service, Columbus, Ohio.
 - P. Bul.—Purdue University, Lafayette, Indiana.
 - U. S. D. A.—U. S. Department of Agriculture, Washington, D. C.
2. Additional references for more extensive reading
 - Harper—Manual of Farm Animals. Macmillan Company, New York.
 - Plumb—Types and Breeds of Farm Animals. Ginn Company, New York.
 - Mumford—Beef Production. H. W. Mumford, Urbana, Illinois.
 - Snapp—Beef Cattle, Their Feeding and Management. Macmillan Company, New York.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Raising a pure bred calf of a beef breed
2. Feeding a lot of from 10-15 beef cattle
3. Keeping feed records on a lot of beef cattle
4. Feeding a baby beef calf

F. CORRELATED LABORATORY EXERCISES, PRACTICUMS, OBSERVATION AND FIELD TRIPS

1. Scoring and judging beef cattle
2. Visit to local feed lots
3. Visits to packing houses
4. Removing horns with caustic potash
5. Observation of diseased animals
6. Castrating calves
7. Preparing animals for show and exhibiting
8. Estimating weight of live animals

G. CORRELATED FARM SHOP WORK

1. Constructing feeding troughs and racks
2. Repairing barns and feeding troughs

III Materials

1. Score cards
2. Chart—Beef Cuts. Wilson & Co., Chicago, Ill.
3. Chart—Food Source Map. Armour & Co., Chicago, Ill.
4. Booklet—Ten Lessons on Meat, and Beef and Veal Charts. National Live Stock and Meat Board, 407 S. Dearborn St., Chicago, Illinois.
5. Charts of Breed Associations. See page 417, Storm and Davis.
6. Charts—Composition of Food Materials, States Relations Service, U. S. D. A., Washington, D. C.
7. Charts—Bulletin of Agricultural Economic Division of Livestock, U. S. D. A., Washington, D. C.
8. Pictures—Division of Agricultural Instruction, U. S. D. A., Washington, D. C.

IV Evidences of Achievement of Goals

- A. MEMBERS OF THE CLASS ENGAGED IN RAISING BEEF CATTLE
- B. ABILITY TO FEED AND MANAGE BEEF CATTLE PROFITABLY
- C. SKILL IN MODERN FEEDING PRACTICES, DEMONSTRATED

POULTRY ENTERPRISE

I Goals of Achievement

- A. Ability to manage successfully a farm flock of poultry
- B. Habits of accuracy in securing, interpreting and applying data on a poultry enterprise
- C. Such knowledge on poultry as may be used to advantage in conducting a poultry project
- D. Attitudes of appreciation for and interest in the farm flock
- E. Skill in participating in the improved practices of the poultry industry
- F. Ability to market poultry products advantageously

II Activities Through Which the Goals May Be Achieved

A. THE PRELIMINARY STUDY

1. The place occupied by poultry farming in the community, as shown by survey
2. Adaptability of poultry to the community
3. Opportunity for boys doing supervised practical work in poultry
4. Experience the pupils have had in rearing and keeping poultry
5. Factors involving capital needed for a given poultry enterprise
6. Advantages and disadvantages of the poultry business
7. Analysis of jobs

B. BY LISTING THE PRINCIPAL JOBS

1. Deciding upon the poultry enterprise to follow
2. Studying breeds
3. Establishing the flock
4. Keeping records and accounts
5. Providing poultry house and equipment
6. Caring for breeding stock
7. Preventing diseases and parasites
8. Hatching and care of chicks
9. Brooding and feeding chicks
10. Caponizing
11. Culling the flock
12. Feeding for egg production
13. Collecting and keeping eggs
14. Preserving eggs
15. Marketing eggs
16. Fattening poultry for market
17. Marketing poultry
18. Preparing and exhibiting birds

C. CLASSROOM INSTRUCTION

*Job**Teaching Content.*

1. Deciding on the poultry enterprise to follow.....(a) Conditions to be taken into consideration—soil conditions, amount of land available, exposure of house site,

marketing; (b) class and variety of birds to have—personal preferences, market demands, eggs or meat or both, demand for breeders—utility or exhibition; (c) factors to be considered in determining the amount of capital necessary—initial cost of birds, cost of baby chicks or eggs, cost of housing, equipment necessary, estimated feed.

References: L. Ch. 1; F. B. 654, 792; U. S. Bul. 467; R. B. 1924 Yearbook, U. S. D. A.; N. J. Bul. 152; L. K. Ch. 1; B.

2. Studying breeds.....(a) Identifications and characteristics of common breeds; (b) purposes for which each common breed is adapted; (c) comparative reputations of strains; (d) definition of terms; (e) advantages and disadvantages of purebreds, grades and scrubs; (f) location and terminology of parts of fowls; (g) community experience with different breeds, as shown by survey.

References: H. Ch. 29; L. Ch. 4 and 5; F. B. 806, 898, 1052; U. of Md. R.; Community Agr. Enterprise Survey.

3. Establishing a flock.....(a) Relative advantages and disadvantages of buying mature fowls; baby chicks and eggs for hatching as ways of improving the home flock; (b) other methods of developing and improving the home flock; (c) when, where and at what age to purchase, and what price to pay for baby chicks; (d) when, where and at what age to purchase mature fowls for breeding; (e) when, where and how many, and what price to pay for eggs for hatching; (f) fowl and egg standards of perfection.

References: H. Chs. 30 and 33; L. Chs. 3, 5 and 30; F. B. 287, 528, 889, and 1040; Bu. of An. Ind. Buls. 110 and 141; Md. Exp. Sta. Bul. 233; U. of Md. R.; A. S. P.

4. Keeping records and accounts(a) What records should be kept; (b) what items should be included in these records; (c) what is the best method of keeping records; (d) time of the year records begin and end.

References: L. Chs. 26 and 29; F. B. 572, 1139, and 746; 1067; B. Chap. on Records.

5. Providing poultry house and equipment.....(a) Location of house; (b) size, type and plan of house; (c) yards and fencing; (d) suitability and economy of construction materials; (e) kind and type of interior equipment; (f) arrangement of interior equipment; (g) advantages, methods and cost of artificial lighting; (h) ventilation and sanitation.

References: L. Chs. 6, 7, 8 and 9; F. B. 278, 528, 574, 889, 1067; Md. Exp. Sta. Buls. and Circulars.

6. Caring for breeding stock... (a) Kind of housing; (b) kind and amount of feed; (c) daily schedule of feeding; (d) importance of grit, mineral matter and fresh water; (e) proportion of females and males; (f) amount of range, and exercise necessary for breeders; (g) length of time after mating before fertile eggs are produced; (h) reproductive systems of fowls; (i) duration of fertility after mating; (j) relation of age to proper mating; (k) frequency of collection for hatching eggs.

References: H. Chs. 31 and 32; L. Chs. 10, 11, 12, 13, 14, 15, 16, 17, and 18; F. B. 287, 528, 574, 682, 889, 1040, and 1067; U. of Idaho Ex. Bul. 36.

7. Preventing diseases and parasites (a) Importance of health; (b) prevention of diseases; (c) common diseases — tuberculosis, roup, cholera, blackhead, limberneck and coccidiosis — method of diagnosis, cause of each, symptoms of each, treatment, if any, for each; (d) parasites — internal — gape, tape and intestinal worms, external — lice and mites, method of breathing and eating, and place of living, control methods.

References: U. of W. Cir. 56; N. J. Buls. 425, 363, 8, 12; F. B. 801, 957, 1337, 1114; R. 341-2, 283, 337, 339; L. 496-503, 324, 507, 513; U. S. D. A. Bul. 553.

8. Hatching chicks..... (a) By hens—selecting eggs for incubation, care of eggs for incubation, selection of the setting hen, where, when and how to set hen, feeding and care of the hen, candling of eggs, treatment of eggs during incubation period; (b) by incubator—kind and size of incubator to use, special care of chicks at hatching time, advantages and disadvantages of natural and arti-

ficial incubation, embryology of the chick, physical principles of the incubator.

References: L. Chs. 18, 19, 20, 21; F. B. 287, 528, 624, 585, 1106; *Publications of incubator companies—see poultry journals for list of advertisers*; U. S. D. A. Bul. 565; Wat., pp. 203; K., pp. 238-265; B., pp. 46-71; Li., pp. 162-228; L. K., pp. 67-91; R. B., pp. 310-337.

9. Brooding and feeding

chicks (a) Method of brooding; (b) choosing the brooder; (c) selecting site for brooder; (d) preparing house and brooder; (e) moving chicks to brooder; (f) feeding chicks; (g) putting chick out of doors; (h) feeding growing chicks.

References: Md. Blueprint; R. B., pp. 360, 36, 363, 367, 368, 371, 369, 266; F. B. 528, 624, 1040, 1111, 1114, 1108, 1376, 657; Li. Ch. 5; L. K., pp. 92-107; B., pp. 71-83.

10. Caponizing (a) Selecting the cockerels; (b) preparing for the operation; (c) performing the operation; (d) caring for birds after operation.

References: R. B., pp. 393; F. B., 849, 657; K.; L. Ch. 23.

11. Culling the flock (a) Time of year to cull; (b) culling.
References: R. B. Ch. 1; F. B. 112 and 1040; L. Ch. 30; U. of W. Cir. 123; U. of Md. Bul. 35.

12. Feeding for egg production (a) Proportion of scratch to mash; (b) computing nutritive ratio; (c) balancing of rations; (d) feeding schedule (e) other food requirements; (f) use of lights; (g) use of succulence.

References: R. B. Ch. 5; F. B. 1067; L. Chs. 11 and 12; K., pp. 321 to 326; W., pp. 171 to 195; C. Lesson 157.

13. Collecting and keeping eggs (a) Best methods of gathering; (b) best methods of keeping eggs for market.

References: Io. Bul. 137; R. B. Ch. 15; F. B. 565; Mo. Cir. 177.

14. Preserving eggs (a) Reasons for preserving eggs; (b) ways of holding eggs; (c) time to preserve eggs; (d) selecting eggs for preserving; (e) methods of preserving; (f) use of preserved eggs.

References: N. J. Ext. Bul. 6; U. S. D. A. Bul. 25; Wat., pp. 324-329; L., pp. 441-443; H., p. 526; F. B. 1109 and 1378; Bu. Ch. Cir. 83.

15. Marketing eggs—

- a. For eating (a) Production of high quality eggs; (b) factors affecting quality; (c) care essential to good quality; (d) candling to determine quality; (e) grading, packing and shipping; (f) market channels.

References: *F. B.* 1378; *N. J. Bul.* 11; *L.*, p. 441; *Wat.*, pp. 318-374; *J.*, pp. 136-137; *Chart "U. S. Standards and Grades for Eggs"*—*Bu. Ec. U. S. D. A.*

- b. For hatching..... (a) Care in collecting; (b) care of breeders to insure fertility; (c) securing the market; (d) advertising; (e) guarantee as to fertility; (f) shipping and prices.

References: *F. B.* 565; *L.*, pp. 428-429; *R. Ch.* 3.

16. Fattening poultry..... (a) Object of fattening; (b) methods; (c) character of ration; (d) length of fattening period; (e) forming the proper rations.

References: *L.*, pp. 403-409; *R. Ch.* 17; *F. B.* 1377; *Bu. of Ch. Cir.* 61.

17. Marketing poultry..... (a) Seasonal production; (b) market channels; (c) preparation of poultry and poultry products for market; (d) methods—when, where and how each is done (beheading, sticking, dislocation); (e) advertising products; (f) cooperative marketing.

References: *L. Chs.* 2 and 25; *F. B.* 1377; *R.* pp. 311-336; *R. B. Ch.* 16; *U. S. D. A. Bu. of Chemistry*—*Cir.* 61.

18. Preparing for and exhibiting birds.....

- (a) Advantages of exhibiting; (b) preparing the birds for exhibition; (c) attention at the show.

References: *L.*, pp. 473-495; *R.*, pp. 554-565; *H.*, pp. 499-509; *R. B. Chs.* 26 and 27; *F. B.* 1115; *N. J. Bul.* 11.

D. READING

1. Legend to instructional material

a. Books

A. S. P.—American Standards of Perfection, Secretary, American Poultry Association, Fort Wayne, Ind.

B.—Brigham "Progressive Poultry Culture." Torch Press, Cedar Rapids, Iowa.

H.—Harper's "Manual of Farm Animals." Macmillan Co., New York.

J.—Jesness "Cooperative Marketing." Lippincott Co., Philadelphia, Pa.

- K.—Kuapp "Poultry Culture, Sanitation and Hygiene." W. B. Sanders Co., Philadelphia, Pa.
- H.—Harper's "Animal Husbandry for Schools." Macmillan Co., New York.
- L.—Lewis "Productive Poultry Husbandry." Lippincott Co., Philadelphia, Pa.
- Li.—Lippincott "Poultry Production." Lea & Febiger, Philadelphia, Pa.
- L. K.—Lamon and Kinghorne "Practical Poultry Culture." Webb Pub. Co., St. Paul, Minn.
- L. L.—Lamon and Lee, F. B. 1067, U. S. D. A.
- P. S. C.—Pearl, Surface and Curtis "Diseases of Poultry." Macmillan Co., New York.
- R. B.—Rice and Botsford "Practical Poultry Management." John Wiley & Sons, New York.
- R.—Robinson "Principles and Practice of Poultry Culture." Ginn & Co.
- Ro.—Robinson "Our Domestic Birds." Ginn & Co.
- Wat.—Watson "Farm Poultry." Macmillan Co., New York.
- 1924 Yearbook, U. S. D. A., Washington, D. C.

b. Bulletins and circulars

- C.—Cornell Bulletins, Cornell University, Ithaca, N. Y.
- Bu. Ch. Cir.—Bureau of Chemistry, Washington, D. C.
- Bu. of An. Husb.—Bureau of Animal Husbandry, U. S. D. A., Washington, D. C.
- Ch.—chapter; p.—page; pp.—pages; Bul.—bulletin; cir.—circular.
- F. Buls.—Farmers' Bulletins, U. S. D. A., Washington, D. C.
- Md. Exp. Sta.—Maryland Experiment Station, College Park, Md.
- N. J.—New Jersey Agricultural College, New Brunswick, N. J.
- U. of Idaho—Moscow, Idaho.
- U. of Md. R.—University of Maryland Report of Egg Laying Contests, College Park, Md.
- U. of Wisconsin—Madison, Wis.
- Yearbook, U. S. D. A., Washington, D. C.
- Storrs, Connecticut Station, Storrs, Conn.

2. Additional references for extensive reading

a. Technical books

- Kaupp "The Essentials of Poultry Raising." Johnson Pub. Co., Richmond, Va.
- Dryden "Poultry Breeding and Management." Orange, Judd Co., New York.
- Lamon and Slocum "The Mating and Breeding of Poultry." Orange, Judd Co., New York.
- Lillie "The Development of the Chick." Henry Holt Co., New York.

Benjamin "Marketing Poultry Products." John Wiley & Sons, New York.

Lewis "Poultry Laboratory Manual." Lippincott Co., Philadelphia, Pa.

Smith "Livestock and Poultry." Smith Pub. Co., Atlanta, Ga.

b. Popular books

Hausen "Commercial Egg Farming." E. P. Dutton & Co., New York.

Howard "American Fanciers' Poultry Book." Howard Pub. Co., Washington, D. C.

Lewis "Making Money From Hens." Lippincott Co., Philadelphia, Pa.

Lewis "Poultry Keeping." Lippincott Co., Philadelphia, Pa.

Roberts "Commercial Poultry Raising." David McKay.

Jackson and Curtis "Profitable Culling and Selective Stock Breeding." Reliable Poultry Journal, Dayton, Ohio.

Jackson "Poultry Houses and Fixtures." Reliable Poultry Journal, Dayton, Ohio.

Valentine "The Beginner in Poultry." Macmillan Co., New York.

c. Bulletins and circulars

U. S. D. A., Washington, D. C.

University of Maryland, College Park, Md.

Cornell University, Ithaca, N. Y.

Pennsylvania State College, State College, Pa.

d. Magazines

American Poultry Journal. 523 Plymouth Court, Chicago, Ill.

Everybody's Poultry Magazine. Box 286D, Hanover, Pa.

O. K. Poultry Journal. Mounds, Okla.

Poultry Tribune. Mount Morris, Ill.

Poultry Item. Sellersville, Pa.

Poultry Science. Urbana, Ill.

Reliable Poultry Journal. Dayton, Ohio.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Care and management of 50-100 hens for egg production
2. Hatching and selling 500 day old chicks
3. Hatching, raising and marketing 100 capons or broilers
4. Obtaining and managing a breeding pen of purebred poultry
5. Raising 50 purebred pullets
6. Raising, care and management of 50 ducks
7. Raising, care and management of 25 turkeys or geese

F. LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS AND FIELD TRIPS

1. Score and cull poultry
2. Select a breeding pen of purebred birds
3. Visit a commercial hatchery in order to observe incubator construction and methods of artificial incubation
4. Observe methods of brooding chicks
5. Prepare and feed growing rations.
6. Caponize cockerels
7. Prepare and feed egg production rations
8. Keep poultry house sanitary
9. Keep egg and feed records on a home flock
10. Visit and compare different types of poultry houses
11. Prepare egg record charts
12. Candle and grade eggs
13. Exhibit purebred birds
14. Run small incubator and brooder
15. Kill and dress poultry
16. Make post-mortem examinations
17. Preserve eggs in water glass
18. Study the development of chicks in eggs in an incubator

G. CORRELATED FARM SHOP WORK

1. Construct a poultry house
2. Build trap nests
3. Build feeding hoppers
4. Construct poultry yard fences
5. Build exhibition coops
6. Lay concrete foundation floors and walks
7. Remodel poultry houses
8. Make chick runs
9. Make egg tester
10. Make water stand
11. Make broody coop

H. CORRELATIONS WITH OTHER HIGH SCHOOL SUBJECTS

1. English
 - a. How I grew my purebred chickens
 - b. A trip to a poultry show
2. Drawing
 - a. Drawing working plans for a poultry house
 - b. Drawing diagrams of poultry house conveniences
3. Science
 - a. The preservation of eggs
 - b. The running of an incubator
 - c. The application of Mendel's Law to poultry
 - d. Principles involved in running a brooder
4. Mathematics
 - a. Making out a bill of lumber for a poultry house
 - b. Estimating the amounts of different feeds to be used in preparing a balanced ration
 - c. The keeping of feed and egg records
5. History
 - a. The history of different breeds of poultry
 - b. The growth in the poultry industry in the United States

III Equipment and Materials

A. NECESSARY

1. Score cards
2. Charts and maps

B. DESIRABLE

1. Collection of poultry feeds
2. Sample cartons
3. Exhibition coops
4. Egg tester
5. Watering and feeding devices
6. Small hand sprayer
7. Caponizing set
8. Sets of lantern slides
9. Catalogues of incubators, brooders and other poultry supplies

C. SOURCES OF ILLUSTRATIVE MATERIALS

1. Purina Mills, 835 S. Eighth Street, St. Louis, Mo.
2. Secretary, American Poultry Association, Fort Wayne, Ind.—slides for sale
3. States' Relation Service, U. S. D. A., Washington, D. C.—sets of slides, charts and motion picture films
4. Pratt Poultry Feed Co., Chicago, Ill.—charts
5. International Harvester Co., Chicago, Ill.—charts
6. Poultry Tribune, Mount Morris, Ill.—set of colored breed pictures

IV Evidences of the Achievement of Goals

- A. SKILL IN IMPORTANT PRACTICES, DEMONSTRATED BY THE INDIVIDUAL MEMBERS OF THE GROUP
- B. ABILITY TO APPLY KNOWLEDGE GAINED THROUGH IMPROVED PRACTICES OF FEEDING POULTRY
- C. INDIVIDUAL MEMBERS OF THE GROUP ESTABLISHED IN THE DIFFERENT POULTRY ENTERPRISES
- D. THE SUCCESSFUL COMPLETION OF A PROJECT OR OTHER SUPERVISED PRACTICAL WORK IN POULTRY
- E. THE EFFICIENT DISPOSAL OF SURPLUS STOCK AND PRODUCTS
- F. COMMUNITY SERVICE RENDERED BY THE GROUP

SWINE ENTERPRISE

I Goals of Achievement

- A. Ability to raise hogs economically
- B. Ability to analyze the different jobs connected with the swine enterprise
- C. Skill in individual performances connected with supervised practical work in the swine enterprise
- D. A maximum of individual pupil participation
- E. An appreciation of the importance of the swine industry in Maryland
- F. A knowledge of the market demands

II Activities Through Which the Goals May Be Achieved

A. THE PRELIMINARY STUDY

1. The relation of the swine enterprise to types of farming
2. The efficiency of swine as producers of human food
3. The distribution of labor, provided by the swine enterprise
4. The possibility of the utilization of low-grade feeds and waste products
5. Over-head expenses in the swine enterprise as compared to such expenses in other animal enterprises
6. Turnover of capital in the swine enterprises, as compared to such turnover in other animal enterprises
7. The ease of marketing swine

B. BY LISTING THE PRINCIPAL JOBS INVOLVED IN THE STUDY OF THE SWINE ENTERPRISE

1. Selecting the breed
2. Selecting and securing breeding stock
3. Feeding and management
4. Castrating young pigs
5. Housing and equipment
6. Breeding
7. Managing sow and pigs
8. Preventing diseases and sanitation
9. Fitting for show
10. Killing and curing
11. Marketing
12. Keeping records

C. CLASSROOM INSTRUCTION

*Job**Teaching Content*

1. Selecting the breed..... (a) Market demand; (b) predominant breeds in community; (c) characteristics of important breeds—prolificacy, rate of maturity, type, etc.

References: F. B. 1263, 1455, 1437, 874, 1236; Md. Ex. Buls. 24, 167; Ia. Ex. Bul. 126; S. C. Bul. 79; D. Ch. 2; Clem. Bul. 79.

2. Selecting and securing breeding stock (a) Size of animal; (b) constitution and feeding qualities; (c) quality; (d) fecundity; (e) general conformation; (f) age-sex; (g) where to procure; (h) price.

References: Casual Observation; County Agent; D. Ch. 3; Breeding Magazines; Ha., pp. 403-452; S., pp. 12-40.

3. Feeding and management... (a) Young pigs; (b) breeders; (c) fattening; (d) sow at farrowing time; (e) sow and litter; (f) pastures and supplementary feeding; (g) self-feeders.

References: D. Chs. 18-29; Ha., pp. 433-448; Md. Bul. 24; Mich. Bul. 5; Wis. Cir. 119; Mo. Cir. 118, 131; Pa. Cir. 77; Pur. Bul. 279; O. Buls. 283, 268, 355, 349, 335; Texas A. & M. Cir. 28.

4. Castrating of young pigs... (a) Purpose of castration; (b) age at which to castrate; (c) selection of pigs for castration; (d) technique.

References: F. B. 780, 1357; County Agent; Farmer.

5. Housing and equipment..... (a) Value of proper housing; (b) types of houses; (c) convenience and accessibility; (d) relation to sanitation; (e) costs.

References: D. Ch. 22; Md. Bul. 24; F. B. 438, 874; Ill. Cir. 306; N. J. Cir. 90; Pa. Cir. 77; Mich. Bul. 5.

6. Breeding (a) Gestation period; (b) age to breed; (c) month to breed; (d) pedigrees and records; (e) condition at breeding time.

References: F. B. 874 and 1437; D. Ch. 3; Md. Bul. 24; Mich. Bul. 5.

7. Managing of sow and pigs. (a) Shelter; (b) bedding; (c) protection from other animals; (d) age to wean pigs; (e) starting feeds for pigs.

References: F. B. 847, 1437; Md. Bul. 25; Mich. Bul. 5; Ia. Bul. 126; N. J. Cir. 90; Pa. Cir. 77; Texas A. & M. Cir. 12; Md. Ext. Bul. 25.

8. Preventing diseases, and sanitation (a) Frequency of cleaning; (b) bedding; (c) capacity of pen and yard; (d) thoroughness of cleaning; (e) disinfectants; (f) exercise, health, vigor; (g) clean feed.

References: F. B. 1085, 834, 781, 1244; D. Ch. 24; Ill. Cir. 269, 261, 306; S., pp. 41-47, 89-99.

9. Fitting for show..... (a) Condition of flesh; (b) cleansing; (c) when to start fitting; (d) feeding for show; (e) cost.

References: Md. Bul. 24; Mich. Bul. 5; County Agent; Professional Showmen; F. B. 1455.

10. Killing and curing.....(a) Time to kill; (b) methods; (c) equipment; (d) curing formulas; (e) costs.
References: F. B. 183, 1186; S., pp. 72-88.
11. Marketing(a) Trend of market; (b) feed costs; (c) age of animals; (d) number on hand.
References: Md. Bul. 24; Market Reports; Mich. Bul. 5; Tex. A. & M. Cir. 20, 30.
12. Keeping records.....(a) Labor; (b) other expenditures; (c) inventories; (d) receipts.
References: Agricultural Instructor, O. Ru. Ec. Buls.

D. REFERENCES

1. Legend to instructional material

a. Books

- D.—Day “Productive Swine Husbandry.” J. B. Lippincott, Philadelphia, Pa.
 Ha.—Harper “Manual of Farm Animals.” Macmillan Co., New York.
 S.—Smith “Livestock and Poultry.” Smith Pub. Co., Atlanta, Ga.

b. Bulletins and circulars

- F. B.—Farmers’ Bulletin, U. S. D. A., Washington, D. C.
 Ia. Ex. Bul.—Iowa Experiment Station, Ames, Iowa.
 Ill. Cir.—University of Illinois, Urbana, Ill.
 Md. Bul.—University of Maryland, College Park, Md.
 Md. Ex. Bul.—Maryland Experiment Station, College Park, Md.
 Mich. Bul.—Michigan Agricultural College, East Lansing, Mich.
 Mo. Cir.—University of Missouri, Columbia, Mo.
 N. J. Cir.—Rutgers College, New Brunswick, N. J.
 O. Bul.—University of Ohio, Columbus, Ohio.
 Pa. Cir.—Pennsylvania State College, State College, Pa.
 Pur. Bul.—Purdue University, Lafayette, Ind.
 Texas A. & M. Cir.—A. and M. College, College Station, Tex.
 Wis. Cir.—University of Wisconsin, Madison, Wis.
 Clem. Bul.—Clemson Agricultural College, Clemson, S. C.

2. Additional references for extensive reading

a. Scientific books

- Coburn “Swine in America.” Orange, Judd Co., New York.
 Dawson “The Hog Book.” Sanders Pub. Co., Chicago, Ill.
 Dawson “Success with Hogs.” Forbes & Co., Chicago, Ill.
 Mumford “The Breeding of Animals.” Macmillan Co., New York.

- Plumb "A Study of Farm Animals." Webb Pub. Co., St. Paul, Minn.
Plumb "Judging Farm Animals." Orange, Judd Co., New York.
Plumb "Types and Breeds of Farm Animals." Ginn & Co., New York.
Tomhave "Meat and Meat Products." Lippincott Co., Philadelphia, Pa.
Smith "Pork Production." Macmillan Co., New York.

b. Popular books

- Larmer "Financing the Livestock Industry." Macmillan Co., New York.

c. Bulletins and circulars

- U. S. D. A., Washington, D. C.
University of Maryland, College Park, Maryland.
Booklets—"Progressive Hog Raising." Armour & Co., Chicago, Ill.
Booklet—"The Story of Soap." Armour & Co., Chicago, Ill.

d. Magazines

- "Breeders' Gazette." Sanders Pub. Co., Chicago, Ill.
Breed Association Journals. See page 418, Storm and Davis, for addresses
"The Swine World." Des Moines, Iowa.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Obtaining, growing and breeding two purebred sows
2. Raising, fattening and marketing a litter of eight pigs
3. Raising and marketing, at weaning time, two litters of purebred pigs

F. LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS AND FIELD TRIPS

1. Scoring and judging swine
2. Selecting a purebred pig
3. Preparing and feeding a balanced ration
4. Castrating pigs
5. Dipping and ringing pigs
6. Preparing plan for, and keeping records on a purebred swine enterprise
7. Selecting a suitable pasture
8. Treating for diseases and parasites
9. Making out registration papers
10. Butchering swine
11. Preparing for, and showing pigs
12. Observing housing conditions

G. CORRELATED FARM SHOP WORK

1. Constructing hog crates
2. Constructing a hog house
3. Concreting the floor to a hog pen
4. Building a hog pen
5. Constructing hog trough and self feeders

H. CORRELATIONS WITH OTHER HIGH SCHOOL SUBJECTS

1. English composition
 - a. How I selected and raised my purebred sow
 - b. A trip through the packing house
2. Drawing
 - a. Drawing of plans for a hog house
 - b. Drawing a diagram of a hog crate
3. Science
 - a. Study of the by-products of a packing plant
 - b. Methods of controlling swine diseases
4. History
 - a. The relation of the swine industry to the development of the Middle West
 - b. The history of the packing industry in Baltimore

III Equipment and Materials**A. NECESSARY**

1. Score cards
2. Set of farm shop equipment (see list elsewhere)
3. Charts and maps. Armour Packing Co., Chicago; Swift & Co., Chicago; different Breed Associations (see p. 418, Storm and Davis); U. S. D. A., Washington, D. C.; also charts distributed by National Livestock and Meat Board, 407 S. Dearborn St., Chicago, Ill.

B. DESIRABLE

1. Sets of lantern slides. Keystone Co., Meadville, Pa.; U. S. D. A., Washington, D. C.

IV Evidences of the Achievement of Goals

- A. SKILL IN PRODUCING SWINE ECONOMICALLY, DEMONSTRATED IN THE SUPERVISED PRACTICAL WORK
- B. A HERD OF PURE-BRED OR HIGH-GRADE SWINE ESTABLISHED
- C. ABILITY TO APPLY KNOWLEDGE GAINED TO THE IMPROVING OF CURRENT PRACTICES IN THE SWINE PRODUCTION INDUSTRY
- D. ABILITY TO MARKET HOGS MOST ADVANTAGEOUSLY

SHEEP ENTERPRISE

I Goals of Achievement

- A. Ability to grow sheep successfully and economically
- B. Skill in collecting, interpreting and applying data on sheep raising
- C. Habits of applying the knowledge gained to actual situations
- D. The development of appreciation for the sheep growing industry
- E. A maximum of pupil participation in activities undertaken
- F. Ability to market sheep and wool advantageously

II Activities Through Which Goals May Be Achieved

A. THE PRELIMINARY STUDY

1. Sheep growing as a profitable livestock enterprise
2. Initial investment necessary, comparatively small
3. Cash returns at three different times of the year
4. Provides quick turnover of capital
5. The market and rate of returns are certain
6. Utilizes farm labor throughout the year and especially at slack seasons of the year.
7. Requires comparatively little time and labor
8. Sheep as an aid in eliminating weeds and brush

B. THE LISTING OF THE PRINCIPAL JOBS

1. Choosing the breed
2. Housing and equipment
3. Securing the sheep
4. Feeding and care
5. Caring for at lambing time
6. Caring for ewes and lambs
7. Castrating and docking
8. Controlling diseases and insect pests
9. Shearing and care of the wool
10. Dipping
11. Marketing the wool
12. Registering the lambs
13. Providing pastures
14. Weaning and fattening the lambs
15. Marketing lambs
16. Fitting and showing
17. Keeping records and accounts

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|----------------------------|---|
| 1. Choosing the breed..... | (a) Types; (b) type characteristics;
(c) adaptability of types; (d) breeds
and characteristics of each. |

References: Co. Ch. 7; F. B. 576; Yearbook separate 894; Co. Part 3; Pb. Ch. 29; H. Ch. 19.

2. Housing and equipment.....(a) Location of barn; (b) type of barn; (c) requirement of barn; (d) arrangement of equipment.
References: Co. Ch. 44; H., pp. 376-379; F. B. 810.
3. Securing sheep.....(a) Age; (b) where; (c) time.
References: Co. Chs. 6-39; Report of Md. Sh. Gr. Ass'n (1926); F. B. 840.
4. Feeding and care.....(a) Ration—sheep, lambs; (b) care during pregnancy.
References: Co. Chs. 25, 33-38; Pb. Chs. 31, 32; H. Chs. 21-22; F. B. 840; N. Dak. Cir. 69; Md. Bul. 36.
5. Caring for at lambing time(a) Providing lambing pens; (b) length of time in lambing pens; (c) aiding ewes at lambing time; (d) equipment.
References: Local sheepmen; Co. Ch. 32; F. B. 810, 840, 1199.
6. Caring for ewes and lambs...(a) Feeds; (b) udder troubles; (c) care of young lambs.
References: Local sheepmen; Co. Chs. 32, 33; H. Ch. 21; F. B. 840, 894.
7. Castration and docking.....(a) Time; (b) instruments; (c) methods.
References: Local sheepmen; Co., pp. 282-283; F. B. 894, 1134.
8. Controlling diseases and insect pests(a) Preventive measures; (b) diagnosis; (c) treatment of each.
References: Co., pp. 296-314; Local sheepmen; F. B. 798, 894, 1155, 1330.
9. Shearing and care of wool...(a) Time; (b) method; (c) shearing equipment; (d) tying of wool.
References: Co. Ch. 35; H. Ch. 22; F. B. 840; Report of Md. Sh. Gr. Ass'n (8th meeting).
10. Dipping(a) Vats; (b) dips.
References: Co., pp. 306-314; H. 374-376; F. B. 798, 840, 1330.
11. Marketing wool.....(a) Grading; (b) where to market; (c) when to market.
References: Co. Ch. 35; U. of Md. Bul. 36; 8th Report of Md. Sh. Gr. Ass'n.
12. Registering the lambs.....(a) Requirements of the association.
References: Breed Associations. See Storm and Davis, p. 418.
13. Providing pastures.....(a) Acreage; (b) kind.
References: Co. Ch. 33; F. B. 840, 1181.
14. Weaning and fattening.....(a) Time; (b) methods; (c) rations; (d) confinement.
References: Co., pp. 285-329; H. Ch. 21; F. B. 840; Md. Bul. 36; Clemson Ext. Bul. 66.

15. Marketing (a) Methods—on foot, dressed.
References: Co. 284, 340; Ch. 45; F. B. 840, 1172; U. S. D. A. 1470.
16. Fitting and showing (a) Conditioning—combing wool, polishing hoofs, trimming wool and hair;
 (b) showing at local, county and state fairs.
References: Co. Ch. 8; H. Ch. 20; F. B. 1199.
17. Records and accounts (a) Daily record—feeds, time of breeding and lambing, notes; (b) labor records; (c) financial records.
References: F. B. 782; Ohio Exp. Sta. Cir. Vol. 9, No. 3.

D. READING

1. Legend to instructional material

a. Books

- Co.—Coffey "Productive Sheep Husbandry." J. B. Lippincott, Philadelphia.
 H.—Harper "Animal Husbandry for Schools." Macmillan Co., New York.
 Pb.—Plumb "Types and Breeds of Farm Animals." Ginn & Co., New York.

b. Bulletins and circulars

- Clemson Ext. Bul., Clemson College, South Carolina.
 F. B.—Farmers' Bulletin, U. S. D. of Agriculture, Washington, D. C.
 Md. Sh. Gr. Ass'n, University of Maryland, College Park, Md.
 N. Dak.—N. Dakota Agricultural College, Fargo, N. D.
 Ohio Exp. Station, Columbus, Ohio.
 Md.—University of Maryland, College Park, Md.
 Sheep Breed Associations—see pg. 418 of Storm and Davis "How to Teach Agriculture." Lippincott, Philadelphia.
 Year Book Separate. U. S. D. A., Washington, D. C.
 U. S. D. A.—U. S. Department of Agriculture, Washington, D. C.

2. Additional references for extensive reading

a. Technical books

- Clarke "Modern Sheep—Breeds and Management." American Sheep Breeders' Ass'n, Chicago, Ill.
 Kleinheinz "Sheep Management." Sanders Pub. Co., Chicago, Ill.
 Miller "The Winter Lamb." Sanders Pub. Co., Chicago, Ill.
 Shaw "Management and Feeding of Sheep." Orange, Judd Co., New York.
 Stewart "The Shepherd's Manual." Orange, Judd Co., New York.
 Wing "Sheep Farming in America." Sanders Pub. Co., Chicago, Ill.

b. Popular books

- Carpenter "How the World Is Clothed." American Book Co., New York City.
Chamberlain "How We Are Clothed." Macmillan Company, New York.
Jackson "Ramona" Sheep Shearing in California.
Omerod "Wool." Henry Holt & Co., New York.
Craig & Marshall "Sheep Growing in North America." Macmillan Co., New York.

c. Bulletins

- U. S. D. A., Washington, D. C.
Booklets—Progressive Sheep Raising and Marketing Live-stock and Meats. Armour & Co., Chicago.

d. Magazines

- American Sheep Breeder and Wool Grower, 817 Exchange St., Chicago.
National Wool Grower. National Wool Growers' Ass'n, Salt Lake City, Utah.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Beginning a pure-bred flock with six ewes and one ram
2. Managing twenty-five sheep for wool and mutton
3. Obtaining, care and management of three pure-bred ewes

F. CORRELATED LABORATORY EXERCISES, DEMONSTRATIONS, PRACTICUMS, AND FIELD TRIPS

1. Scoring, judging and selecting sheep
2. Identifying of breeds of sheep
3. Preparing and feeding rations
4. Keeping a sheep "creep" sanitary
5. Fitting and exhibiting sheep
6. Shearing and dipping sheep
7. Castrating and docking lambs
8. Treating sheep for diseases and insects
9. Trimming hoofs of sheep
10. Butchering sheep
11. Preparing graphs showing price curves
12. Grading wool

G. CORRELATED FARM SHOP WORK

1. Constructing feeding troughs
2. Constructing a sheep barn
3. Constructing fences and corrals
4. Remodelling sheds or barns
5. Laying concrete walks and floors

H. CORRELATIONS WITH OTHER HIGH SCHOOL SUBJECTS

1. English—compositions on such topics as
 - a. Sheep Growing in Maryland
 - b. Sheep Growing in the West
 - c. The Uses of WoolDebates on such topics as
 - a. Resolved, That pure-bred sheep are better adapted to Maryland conditions than are grades
 - b. Resolved, That the direct purchase of pure-bred sheep is preferable to the using of a pure-bred ram on grade ewes in the building up of a flock of sheep
2. Drawing
 - a. Plans for the sheep barn
 - b. Layout for a sheep farm
3. Mathematics
 - a. Estimating lumber necessary for a sheep barn
 - b. Balancing feeding rations
4. Science
 - a. Preparing insecticides for dipping vats
 - b. The study of a shearing machine
 - c. Steps in the manufacture of clothing from wool
 - d. The improving of sheep through breeding and selection
5. History
 - a. The relation of the sheep industry to the historical and economical development of the United States
 - b. The history of the breeds of sheep
6. Commercial Geography
 - a. Locating the native homes of the different breeds of sheep
 - b. The effect of environment on sheep

III Equipment and Materials**A. NECESSARY**

1. Score cards
2. Charts and maps—Armour & Co., Chicago, Ill.; Swift & Co., Chicago, Ill.; Breed Associations, see Storm and Davis, p. 418; also charts by Bu. Agr. Ec. Division of Livestock, U. S. D. A., Washington, D. C.

B. DESIRABLE

1. Shears
2. Knives for butchering, castrating and trimming hoofs
3. Docking equipment
4. Sets of slides—Agricultural Education Service, U. S. D. A., Washington, D. C.; Keystone Co., Meadville, Pa.

IV Evidence of Achievement of Goals

- A. THE SATISFACTORY COMPLETION OF A SHEEP PROJECT.
- B. THE ACTUAL CARE AND MANAGEMENT OF A FLOCK OF SHEEP
- C. FORMER PUPILS ESTABLISHED AS PRODUCERS OF PURE-BRED OR HIGH GRADE SHEEP

HORSE AND MULE ENTERPRISE

I Goals of Achievement

- A. The attaining of such knowledge as will result in the proper feeding, management and use of horses and mules
- B. Skill in feeding, breeding and raising horses and mules
- C. An appreciation of the horse and mule in industry, agriculture, recreation and national defense

II Activities Through Which Goals May Be Achieved

A. THROUGH PRELIMINARY STUDY

1. Reasons for the number of horses decreasing from 141,341 in 1920 to 116,711 in 1925, and for mules decreasing from 32,621 in 1920 to 30,733 in 1925 in Maryland
2. The probable future demand for horses and mules in Maryland
3. The present conditions relative to supply and demand
4. Present methods of caring for and treatment of animals

B. BY LISTING PRINCIPAL JOBS

1. Comparing horse and motor power
2. Studying types of horses and mules
3. Comparing characteristics of breeds
4. Judging horses
5. Securing horses and mules
6. Caring for and management of horses and mules
7. Feeding horses and mules
8. Working and keeping records
9. Fitting and showing horses and mules.

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|---|
| 1. Comparing horse and motor power | (a) Sources; (b) economy.
<i>References: G., pp. 3-34, 314-324; H. A. A. Buls.</i> |
| 2. Studying types and classes of horses and mules..... | (a) Types; (b) adaptability of each to Maryland conditions.
<i>References: G., pp. 35-69, 309-313; H., pp. 17-71; P., pp. 138-139.</i> |
| 3. Comparing characteristics of breeds | (a) Principal breeds; (b) characteristics of each breed adapted to Maryland conditions.
<i>References: G., pp. 70-138; H., pp. 17-49; P., pp. 144-163.</i> |
| 4. Judging horses..... | (a) Considerations; (b) use of score card.
<i>References: G., pp. 139-175; P., pp. 125-137, 164-196.</i> |
| 5. Securing horses and mules..... | (a) Supply and demand; (b) selecting; (c) sources of supply; (d) raising.
<i>References: G., pp. 179-215, 296-308; H., pp. 105-119; Sm., pp. 368-397.</i> |

6. Caring for and management of horses (a) Housing; (b) management; (c) training young animals; (d) diseases and parasites.
References: G., pp. 219, 230; 247-285; *H.*, pp. 120-138; *P.*, pp. 208-216.
7. Feeding (a) Work vs. maintenance rations; (b) time of feeding.
References: G., pp. 231-246; *H.*, pp. 72-104; *P.*, pp. 197-207; *Sm.*, pp. 401-412.
8. Working and keeping records (a) Factors influencing; (b) care and repair of harness; (c) multiple hitches.
References: Sm., pp. 413-431; *H.*, pp. 139-153; *Smh.*, pp. 261-271; *H. A. A. Buls.*
9. Fitting and showing horses and mules (a) Feeding; (b) grooming; (c) handling.
References: G., pp. 296-297; *Percheron Review*, 1926, p. 38.

D. READINGS

1. Legend to instructional material
D. H.—"Diseases of Horses." U. S. D. A., Washington, D. C. (Obtain through Senator.)
G.—Gay "Productive Horse Husbandry." Lippincott Co., Philadelphia, Pa.
H.—Harper "Animal Husbandry for Schools." Macmillan Co., New York.
H. M.—Henry & Morrison "Feeds and Feeding"—Abridged. Henry-Morrison Co., Madison, Wis.
P.—Plumb "A Study of Farm Animals." Webb Publishing Co., Minneapolis, Minn.
Sm.—Smith "Live Stock and Poultry." Smith Publishing Co., Atlanta, Ga.
Smh.—Smith "Agricultural Mechanics." Lippincott Co., Philadelphia, Pa.
H. A. A.—Horse Association of America, Union Stock Yards, Chicago, Ill.
2. Additional references for more extensive reading
Vaughan "Types and Market Classes of Livestock." R. G. Adams Co., Columbus, Ohio.
Plumb "Types and Breeds of Farm Animals." Ginn & Co., New York.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Obtaining and raising of a colt
2. Feeding and care of the farm horses or mules
3. Keeping records of man and horse labor required for field operations

F. CORRELATED LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS AND FIELD TRIPS

1. Judging horses
2. Estimating the selling value of horses and mules
3. Harnessing, hitching and driving horses
4. Training a colt
5. Cleaning and disinfecting stables
6. Feeding and grooming horses
7. Treating horses for minor ailments
8. Determining age of horses

G. CORRELATED FARM SHOP WORK

1. Repairing harness
2. Repairing barns and barn equipment
3. Making double trees and arranging pullies, chains, "tying in" and "bucking back" straps for multiple hitches

III Equipment and Materials

1. Score cards
2. Pictures—Agricultural Education Division, U. S. D. A., Washington, D. C.
3. Charts from different feed companies and breed associations.

IV Evidences of Achievement of Goals

- A. BETTER FEEDING AND MANAGEMENT OF THE HORSES AND MULES ON THE LOCAL FARMS
- B. ABILITY TO SELECT AND PURCHASE HORSES AND MULES INTELLIGENTLY
- C. ABILITY TO WORK AND HANDLE HORSES AND MULES INTELLIGENTLY

BEE ENTERPRISE

I Goals of Achievement

- A. Ability to manage a small apiary
- B. Skill in colony control
- C. To develop an interest in bee culture
- D. A knowledge of the fundamental principles involved in bee culture
- E. Ability to produce a high grade of honey

II Activities Through Which Goals May Be Achieved

A. THE PRELIMINARY STUDY

1. The importance of the bee enterprise in the United States
2. The adaptability of bee culture to Maryland conditions
3. The small amount of capital and labor necessary in developing a bee enterprise
4. An analysis of the jobs involved

B. LISTING THE PRINCIPAL JOBS

1. Establishing an apiary
2. The selecting and purchasing of bees
3. Choosing and assembling equipment
4. Pasturing bees
5. Managing bees in the spring
6. Controlling swarm
7. Increasing the number of colonies
8. Producing section comb honey
9. Producing extracted honey
10. Marketing honey
11. Managing in late summer and next year's honey crop
12. Wintering bees
13. Controlling diseases
14. Controlling enemies
15. Keeping records and accounts

C. CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|---|
| 1. Establishing an apiary..... | (a) Points to consider in locating a bee yard; (b) essentials of a suitable location. |
| <i>References: Md. Ext. Cir. 38; Dd., pp. 26-33; Ls.; F. B. 447; Pt. Chs. 1 & 2.</i> | |
| 2. Choosing and assembling of equipment | (a) How "standard" equipment insures lower costs; (b) necessary equipment for honey production; (c) super equipment for extracted honey; (d) super equipment for section comb honey; (e) how to assemble hives. |
| <i>References: A. H., pp. 28-37; F. B. 447, 1039; Dd., pp. 38-49.</i> | |

3. The selecting and purchasing of bees.....(a) How to care for package bees; (b) how to care for nuclei; (c) how to buy queen bees.

References: Ls.; Dd., pp. 1-37; Pt. Chs. 3 & 5.

4. Pasturing bees.....(a) Trees for shade and honey; (b) plants for field and roadside; (c) weeds as honey producing plants.

References: Dd., pp. 121-135; Pt. Ch. 5.

5. Managing bees in the spring(a) Relation of fall work to spring management; (b) colony requirements in spring; (c) cellar wintering and its effect on spring management; (d) management of outdoor colonies in winter.

References: A. H., pp. 38-45; Ls.; Dd., pp. 42-50, 116-120; Pt. Chs. 7 & 8.

6. Controlling swarm(a) Objects of swarm control; (b) causes of swarming; (c) clipping queens; (d) control of, after swarming.

References: F. B. 1198; Dd., pp. 54-61; A. H., pp. 46-53; Pt. Ch. 7.

7. Increasing the number of colonies(a) Choose plan of increasing carefully; (b) precautions in increasing.

References: A. H., pp. 74-83; Dd., pp. 33-66; Pt. Ch. 7.

8. Producing section comb honey(a) Requirements for successful production; (b) how to produce maximum crop; (c) removing the honey from the hives.

References: F. B. 1039; Dd., pp. 86-96; A. H., pp. 55-62; Pt. Ch. 7.

9. Producing extracted honey.(a) Strength of colonies at beginning of honey flow; (b) production of a maximum crop of honey; (c) taking off filled supers at end of honey flow; extracting honey.

References: A. H., pp. 64-72; Dd., pp. 96-106; Pt. Ch. 10.

10. Marketing honey.....(a) Assorting and grading the honey; (b) shipping honey; (c) advertising.

References: D. C. 364; Dd., pp. 148-156; Pt. Ch. 14.

11. Managing in late summer and next year's honey crop.(a) Requeening; (b) reducing colonies to winter proportions; (c) feeding colonies; (d) preparing form of protection.

References: A. H., pp. 4-15; Dd., pp. 70-73, 115-120.

12. Wintering bees (a) Requisites for safe wintering;
(b) providing protection from wind
for the apiary; (c) packing bees be-
fore settled cold weather.

References: F. B. 1012, 1014, 695; A. H., pp. 17-26; Dd., pp. 107-120; Pt. Ch. 13.

13. Controlling diseases (a) American foulbrood—symptoms,
prevention and cure; (b) European
foulbrood—symptoms, treatment; (c)
pickled brood; (d) May disease; (e)
diarrhoea.

References: F. B. 975, 1084; Dd., pp. 142-147; Pt. Ch. 12.

14. Controlling enemies..... (a) Birds; (b) ants; (c) bee moth.

References: Dd., pp. 138-141; Pt. Ch. 12.

15. Keeping records and ac-
counts (a) Purpose; (b) methods.

D. READING

1. Legend to instructional material

a. Books

Ls.—Lewis' Booklets on "Beekeeping." S. B. Lewis Co., Water-
town, Wis.

A. H.—Atkins & Hawkins "How to Succeed With Bees."
Democrat Printing Co., Madison, Wis.

Dd.—Dadant "First Lessons in Beekeeping." American Bee
Journal, 1924, Hamilton, Ill.

Pt.—Pellet "Productive Beekeeping." Lippincott Co., Phila-
delphia, Pa.

Md. Ext. Cir.—Extension Service, University of Maryland,
College Park, Md.

b. Bulletins

Farmers' Bulletins, U. S. Department of Agriculture, Wash-
ington, D. C.

Circulars, U. S. D. A., Washington.

Beekeeping for Beginners Bul. 255, Texas A. & M. College,
College Station, Texas.

2. Additional references for more extensive reading

a. Technical books

"Fifty Years Among the Bees," C. C. Miller. The A. I. Root
Co., Medina, Ohio.

Pellet "Practical Queen Rearing," "American Honey Plants."
American Bee Journal, Hamilton, Ill.

Dadant "Outapiaried." American Bee Journal, Hamilton, Ill.

b. Popular books

- Hawkins "Beekeeping in the South." American Bee Journal, Hamilton, Ill.
Miller "A Thousand Answers to Beekeeping Questions." American Bee Journal, Hamilton, Ill.
Langstroth & Dadant "The Honey Bees." American Bee Journal, Hamilton, Ill.
Porter "The Keeper of the Bees."

c. Bulletins

- Farmers' Bulletin 122, U. S. D. A., Washington, D. C.
Dept. Bulletin 1339, U. S. D. A., Washington, D. C.
Bul. 434, New Jersey Experiment Station, New Brunswick, N. J.

d. Magazines

- American Bee Journal, Hamilton, Ill.
Gleanings in Bee Culture
The Bee Hive, Medina, Ohio

E. TYPICAL PRACTICAL WORK

1. Obtaining and caring for five colonies of bees
2. Extracting and marketing honey from the home apiary

F. LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS AND FIELD TRIPS

1. Selecting a colony of bees
2. Examining an apiary for diseases and insects
3. Making a chart on date of honey flow by different plants
4. Preventing swarming
5. Hiving a swarm of bees
6. Extracting honey
7. Keeping records on a community apiary
8. Feeding of bees
9. Observing methods of wintering

G. CORRELATED FARM SHOP

1. Constructing bee hives
2. Building extra supers
3. Assembling equipment
4. Building feeders

H. CORRELATIONS WITH OTHER HIGH SCHOOL SUBJECTS

1. English composition
 - a. The work of a Beekeepers' Association
 - b. The part organization plays in a colony of bees
2. Drawing
 - a. Drawing plans for a bee hive
 - b. Planning an apiary
3. Science
 - a. The development of a queen bee
 - b. Commercial methods of extracting honey
4. Mathematics
 - a. Estimating the capital necessary for operating an apiary
 - b. Keeping records on an apiary
5. History
 - a. The history of cooperative Beekeepers' Association

III Equipment and Materials

- A. DIFFERENT TYPES OF BEE HIVES
- B. CONVENIENCES

IV. Evidences of Achievement of Goals

- A. FORMER PUPILS ESTABLISHED AS COMMERCIAL BEEKEEPERS
- B. ADDITIONAL INTEREST IN BEE CULTURE
- C. MORE COLONIES OF BEES KEPT IN THE COMMUNITY
- D. THE COOPERATIVE MARKETING OF HONEY, DEMONSTRATED

ANIMAL ENTERPRISE MATERIALS AND EXHIBITS OTHER THAN THOSE LISTED IN FARM ENTERPRISE OUTLINES

1. *Booklets*

- a. Farm buildings—Booklets on Farm Buildings. James Mfg. Co., New York; The Loudon Machinery Co., Fairfield, Iowa
- b. Pratt Food Company, Chicago, Ill.
- c. U. S. Hame Company, Buffalo, N. Y.

2. *Charts*

- a. Animals—set of Animal Charts and collection of bulletins. International Harvester Company, Chicago, Ill.
- b. Breeding—Breeding Charts. Armour & Co., Chicago, Ill.
- c. Brooder. Newton Giant Incubator Co., Springfield, Ohio
- d. Livestock—Livestock Charts. Division of Agr. Instruction, U. S. D. A., Washington, D. C.
- e. Poultry. M. M. Johnson Incubator Co., Clay Center, Neb.
- f. Purebred Sires. Agr. College, Ames, Iowa
- g. Stock Associations. See Storm & Davis, pp. 417-418 for lists of Livestock Associations
- h. Meat. Wilson & Co., 4100 S. Ashland Ave., Chicago, Ill.; Armour & Co., Chicago; Swift & Co., Chicago.

3. *Circulars*

- a. Essentials of Animal Breeding. F. B. 1167, U. S. D. A., Washington, D. C.
- b. Livestock Judging. Extension Circular 52, Pa. State College, State College, Pa.
- c. Fundamentals of Livestock Judging. Extension Circular 96, University of Kentucky, Lexington, Ky.

4. *Laboratory Manual*

- a. Bray & Schmidt "Practical Activities in Animal Husbandry." The Century Co., New York.

5. *Maps*

- a. Food Source Map. Armour & Co., Chicago, Ill.

FARM MANAGEMENT ENTERPRISE

I Goals of Achievement

- A. Ability to select, organize and manage a farm management enterprise in such a way as to secure the maximum continuous profit
- B. A maximum of pupil participation in the securing of such data as may be used to advantage in determining a sound basis for all practices adopted
- C. An understanding of the factors involved in successful farm operation

II Activities Through Which Goals May Be Achieved

A. THE PRELIMINARY STUDY

1. The need for economical farm management
2. An analysis of the factors involved in farm management

B. THE LISTING OF THE PRINCIPAL JOBS

1. Selecting a farm
2. Procuring a farm
3. Determining enterprises
4. Determining the immediate improvements to be made
5. Procuring money to operate a farm
6. Purchasing livestock, machinery and supplies
7. Securing insurance
8. Farm accounting
9. Procuring and managing farm labor
10. Maintaining soil fertility
11. Marketing farm products
12. Paying taxes
13. Establishing relations with neighbors

C. CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|--|
| 1. Selecting a farm—Factors to be considered in selecting | (a) Personal preference; (b) earning capacity; (c) size and layout; (d) soil; (e) health; (f) water supply; (g) ease and cost of upkeep; (h) markets; (i) social conditions. |
| <i>References: W. Ch.; A.; F. B. 1088; M. G. K. Ch. 15.</i> | |
| 2. Procuring a farm..... | (a) Purchasing or renting; (b) financing—farm loan, private, local banks. |
| <i>References: W. Ch.; A. Ch.</i> | |
| 3. Determining enterprises | (a) Types of local farming; (b) specialized or diversified; (c) major enterprise; (d) markets. |
| <i>References: W. Ch.; A. Ch.; Local Farmers; M. G. K. Ch. 20.</i> | |

4. Determining the immediate improvements to be made.....(a) Will depend upon enterprise selected.

References: F. B.

5. Procuring money to operate a farm.....(a) Private loans; (b) local banks; (c) farm loan banks.

References: W. Ch.; A. Ch.; Local Banks; Fed. Farm. Loan Cir.

6. Purchasing livestock, machinery and supplies.....(a) Livestock—breeds and number; (b) farm machinery and supplies—kind, quantity and quality.

References: M. G. K. Ch. 23; Co. Agent; Local Breeders; Breeders' Ass'n; W. Ch.; A. Ch.; R. Ch.

7. Securing insurance.....(a) Rates of insurance; (b) what to insure; (c) one year term vs. long terms.

References: Insurance Agents; Insurance Companies

8. Farm accounting(a) Kinds of records to keep; (b) time to take inventory, rate of valuation of real estate, machinery, livestock and supplies; (c) books and forms to use; (d) time allotted to accounting.

References: W. Ch.; A. Ch.; F. B. 511, 572, 782 and 1182; C. L. M.; M. G. K. Ch. 24.

9. Procuring and managing farm labor(a) Different types of labor—man, horse, machine; (b) rate allowed for different types of labor; (c) desirable type of farm labor; (d) hours and rate of pay.

References: W. Ch.; A. Ch.; Local Farmers; F. B. 989; M. G. K. Ch. 24.

10. Maintaining soil fertility.....(a) Ways in which productivity may be decreased; (b) maintaining organic matter; (c) maintaining mineral matter and nitrogen supply; (d) value and care of farm manure; (e) green manures; (f) best ways of maintaining soil fertility.

References: W. Ch.; A. Ch.; M. G. K. Ch. 17.

11. Marketing of farm products (a) Ways of selling; (b) time to sell; (c) transportation; (d) price quotations; (e) grading products; (f) co-operative marketing; (g) weakness, remedies and governmental activities.
References: Ybk. 1922; We.; W.; A.; M.; F. B. 1144; M. G. K. Chs. 2-9.
12. Paying taxes (a) Making tax returns; (b) how tax money is used, and rate of distribution.
13. Establishing relations with neighbors (a) Social organizations; (b) economic organizations.
References: F. B. 1144, 1173, 1232, 1289, 1325; Ybk. 1917; M. G. K. Chs. 26-28.

D. READINGS

1. Legend to instructional material

a. Books

- A.—Adams "Farm Management." McGraw Hill Book Co., New York
- B.—Boss "Farm Management." Lyons & Carnahan, Chicago.
- C. L. M.—Currier, Lennes & Merrill "Farm Accounting." Macmillan Co., New York
- M.—Macklin "Efficient Marketing for Agriculture." Macmillan Co., New York
- M. G. K.—Macklin, Grimes & Kolb "Making the Most of Agriculture." Ginn & Co., New York
- W.—Warren "Farm Management." Macmillan Co., New York
- We.—Weld "Marketing of Farm Crops." Macmillan Co., New York

b. Bulletins

- F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.
- Ybk.—Yearbook, U. S. D. A., Washington, D. C.

2. Additional references for more extensive reading

a. Technical books

- Bexall & Nichols "Farm Accounts." American Bk. Co., New York
- Card "Farm Management." Doubleday, Page, Garden City, N. Y.
- Storm & Davis "How to Teach Agriculture" (Chapter 11). Lippincott Co., Philadelphia, Pa.
- Davenport "The Farm." Macmillan Co., New York

b. Popular books

Warren & Pearson "The Agricultural Situation." John Wiley Co., New York

Note: See Agricultural Economics list for additional references

c. Magazines

Maryland Farmer. 111 N. Charles St., Baltimore, Md.

Breeders' Gazette. Sanders Publishing Co., Chicago

Farm Mechanics. Chicago, Ill.

Hoard's Dairyman. Fort Atkinson, Wis.

Successful Farming. 1714-24 Locust St., Des Moines, Iowa

Stockman and Farmer. Harrisburg, Pa.

Maryland Conservationist. 514 Munsey Building, Baltimore, Maryland.

The Country Gentleman. Curtis Pub. Co., Philadelphia, Pa.

Farm and Fireside. Crowell Pub. Co., Springfield, Ohio

The American Boy. Sprague Pub. Co., Detroit, Mich.

Pennsylvania Farmer. Philadelphia, Pa.

- d. Bulletins—Address Agricultural Educational Service, U. S. D. A., Washington, D. C., for complete list of available books and bulletins

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Keeping a complete record of the entire farm business for one year, including the initial and final inventory
2. Continuing a livestock or farm crops project begun during a preceding year
3. Marketing of crop or livestock products

F. CORRELATED LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS OR FIELD TRIPS

1. Assisting farmers with inventories
2. Making community surveys
3. Keeping cost accounts on a major farm enterprise
4. Drawing a layout of typical farms of the community
5. Drawing plans for beautifying the farm home
6. Planning crop rotations
7. Planning the farm woodlot
8. Observing methods used by typical farmers of the community
9. Taking farm inventories

G. CORRELATED FARM SHOP WORK

1. Laying concrete walks about the farm home
2. Building home conveniences
3. Repairing farm buildings
4. Installing a lighting system in farm buildings
5. Repairing harness
6. Sharpening tools
7. Soldering
8. Splicing rope and lacing belts
9. Constructing a farm gate
10. Constructing a home farm shop
11. Listing tools necessary for a home farm shop
12. Draw plans for remodelling a barn

H. CORRELATIONS WITH OTHER HIGH SCHOOL SUBJECTS

1. English—debates on such topics as:
 - a. Resolved, That the school and social conditions are of more importance in selecting a farm than are the farming conditions
 - b. Resolved, That the improving of the farm home conditions are of more importance than the improving of the land itself

Note: See page 242, Storm & Davis, for a more detailed list of debatable agricultural subjects
2. Drawing
 - a. Drawing plans for a farm home
 - b. Drawing the farm home layout with plantings needed, indicated
3. Mathematics
 - a. Computing the labor income on the home farm
 - b. Estimating the cost of repairing a farm building
4. Science
 - a. The manufacture of commercial fertilizers
 - b. The effect of different fertilizers on plants
5. History
 - a. The relation of soil depletion to the development of nations
 - b. The effect of soil fertility upon the early settlement in the United States

III Equipment and Materials

A. DESIRABLE EQUIPMENT

1. Stereopticon
2. Sets of slides
3. Sets of tools (see list elsewhere)
4. Camera

B. MATERIALS

1. Farm accounts books or bulletins
2. Blanks for making studies
3. Weather and topography maps
4. Charts of typical farm layouts

IV Evidences of Achievement of Goals

- A. MEMBERS OF GROUP ESTABLISHED ON FARMS
- B. MEMBERS OF GROUP EMPLOYED AS FARM MANAGERS
- C. SKILL IN MANAGING FARMS DEMONSTRATED BY MEMBERS OF FORMER AGRICULTURAL CLASSES
- D. THE KEEPING OF FARM ACCOUNTS SUCCESSFULLY, DEMONSTRATED

AGRICULTURAL ECONOMICS ENTERPRISE

I Goals of Achievement

- A. Such knowledge as will convince the pupils that agriculture is recognized in America as a business
- B. An appreciation of the influence of the farm business on the remainder of the nation
- C. An understanding of changes necessary in the economic problems, due to inventions, etc.
- D. Such an understanding on the part of each pupil as will enable him to solve his own farm economic problems
- E. The preparation of each pupil to take an active part in the rural economic development of his community
- F. A knowledge of world production, and demands

II Activities Through Which the Goals May Be Achieved

A. THE PRELIMINARY SURVEY

1. A local survey should be made in order to determine the points to be given most consideration
2. A consideration of the factors affecting agricultural economics—from a national, county, community, farm owner, and farm laborer, point of view

B. THE LISTING OF THE PRINCIPAL JOBS IN AGRICULTURAL ECONOMICS

1. Estimating the scope of the farm business
2. Deciding upon factors affecting agricultural production
3. Comparing types of farming
4. Determining factors affecting the farm balance
5. Obtaining satisfactory farm labor
6. Renting and tenantry
7. Financing the farm business
8. Organizing cooperative associations
9. Transporting farm products
10. Marketing farm products
11. Comparing types of farm power from an economic standpoint
12. Keeping records and accounts
13. Analyzing the present agricultural situation

C. CLASSROOM INSTRUCTION

<i>Job</i>	<i>Teaching Content</i>
1. Estimating the scope of the farm business.....	(a) Area, value, value of farm products; (b) average production of the leading crops; (c) number and type of people employed; (d) comparison of sizes of farms, receipts, production, and expenses; (e) relation of size of farms to the prosperity of the nation.

References: A. Ch. 2; F. B. 1132, 1139; U. S. D. A. *Buls.* 848 and 920; W. Chs. 7 and 8; U. S. D. A. *Cir.* 32; M. G. K. Ch. 14.

2. Deciding upon factors affecting agricultural production (a) Causes for variations; (b) comparison of the leading nations, and their effect upon each other; (c) relation of types of soil and land; (d) relation of farm animals and farm crops; (e) methods of economizing; (f) relation of climate and rainfall upon production.
References: M. G. K. Ch. 19; A. Ch. 3; B. Ch. 17; C.; T.; F. B. 924, 1296; U. S. D. A. Cir. 32; Weather Bur. Map.
3. Comparing types of farming (a) Types defined; (b) factors determining the types.
References: A. Ch. 6; B. Ch. 4; F. B. 1289; N. J. Exp. Buls. 294, 312, 320, 329; W. Chs. 2, 3, 4.
4. Determining factors affecting the farm balance..... (a) Organization of the farm; (b) labor distribution; (c) crop rotations; (d) distribution of risks and incomes.
References: A. Ch. 4; B. Ch. 8; F. B. 745, 746; U. S. D. A. Buls. 528 and 694; W. Ch. 14; Yearbook, 1925.
5. Obtaining satisfactory farm labor (a) Sources of farm labor; (b) effect of education upon farm labor; (c) adjustment of wages; (d) difficulties in obtaining satisfactory labor; (e) reasons for scarcity of labor; (f) solving the labor problem.
References: M. G. K. Ch. 23; A. Ch. 19; B. Ch. 12; Bu. Sts. Bul. 48; C. Bul. 295; Mo. Rch. Bul. 6; U. S. D. A. Bul. 3; W. Ch. 11.
6. Renting and tenancy..... (a) Basis of land rental; (b) systems of land rental; (c) principles underlying lease and share contracts.
References: Ad. Ch. 23; B. Ch. 16; C.; Ca.; Cy. of Agr.; F. B. 280; Yearbook, 1923.
7. Financing the farm business (a) Sources of farm credit; (b) types of farms in relation to capital; (c) farm loans; (d) relation of capital to types of farming and profits.
References: Ad. 11; A. Ch. 5; Bo. Ch. 11; F. B. 593, 792; Fed. Land Bank; T.; U. S. D. A. Buls. 384, 409, 968; W. Ch. 9.
8. Organizing cooperative associations (a) The fundamental principles of co-operation; (b) forms of cooperative associations; (c) methods of financing; (d) management of cooperative organizations.
References: M. G. K. Chs. 11-13; A.; F. B. 1144; T.; J. Chs. 1-21; U. S. D. A. Cir. 407; U. S. D. A. Bul. 1302.

9. Transporting farm products (a) Methods of transportation; (b) effect of transportation upon production; (c) costs of transportation.
References: A. Ch. 17; F. B. 1314; T.; Yearbook, 1924; M. Ch. 7.; M. G. K. Ch. 6.
10. Marketing of farm products (a) Functions of marketing; (b) standardization; (c) storing; (d) distribution; (e) advertising.
References: M. G. K. Chs. 2-5; A. Ch. 16; Ca.; Cy. Agr.; F. B. 62, 184, 830; M. Ch. 1-19; U. S. D. A. Bul. 36, 1302; W. Ch. 15.
11. Comparing types of farm power from an economic standpoint (a) Horse power; (b) motor power; (c) electrical power; (d) farm machinery.
References: A. Ch. 18; F. B. 1093; Ill. Bul. 231; R. pp. 16-20, 188-214; Bu. Sts. Bul. 18, 429, 477.
12. Records and accounts (a) Purpose of records and accounts; (b) value; (c) methods of keeping accounts.
References: M. G. K. Ch. 24; Ad. Ch. 16-18; A. Chs. 12-13; B. N.; C. L. M.; F. B. 511, 572 and 782; W. Chs. 16-17.
13. Analyzing the present agricultural situation (a) Local and national problems; (b) legislation affecting.
References: W. P.; R. C. Vol. 1-4; M. G. K. Ch. 1.

D. READINGS

1. Legend to instructional material

a. Books

- A.—App "Farm Economics." Lippincott Co., Philadelphia.
 Ad.—Adams "Farm Management." McGraw Hill Book Co., New York.
 B.—Boss "Farm Management." Lyons & Carnahan, Chicago.
 Ca.—Card "Farm Management." Doubleday, Page & Co., Garden City, N. Y.
 M.—Macklin "Efficient Marketing for Agriculture." Macmillan Co., New York.
 M. G. K.—Macklin, Grimes, Kolb "Making the Most of Agriculture." Ginn & Co., New York.
 W.—Warren "Farm Management." Macmillan Co., New York.
 We.—Weld "Marketing of Farm Products." Macmillan Co., New York.
 B. N.—Bexall and Nichols "Farm Accounts." American Book Co., New York.
 C. L. M.—Currier, Lennes and Merrill "Farm Accounting." Macmillan Co., New York.
 Bo.—Boyle "Agricultural Economics."—Lippincott Co., Philadelphia.

- C.—Carver "Elements of Rural Economics." Ginn & Co., New York.
- G.—Galpin "Rural Life." The Century Co., New York.
- Gi.—Gillette "Rural Sociology." Macmillan Co., New York.
- Gr.—Gray "Economics for the General Reader." Macmillan Co., New York.
- Gy.—Gray "Introduction to Agricultural Economics." Macmillan Co., New York.
- R.—Ransower "Farm Equipment for the Farm and the Farmstead." Ginn & Co., New York.
- T.—Taylor "Agricultural Economics." Macmillan Company, New York.
- W. L.—Warren and Livermore "Laboratory Exercises in Farm Management."
- W. P.—Warren and Pearson "The Agricultural Situation." John Wiley Co., New York.
- R. C.—Report of Commission on Agricultural Inquiry. Government Printing Office, Washington, D. C.
- J.—Jesness "Cooperative Marketing of Farm Products." Lippincott Co., Philadelphia, Pa.

b. Bulletins and circulars

- F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.
- Fed. Ld. Bank—Federal Land Bank, 23rd Street and St. Paul, Baltimore, Md.
- U. S. D. A. Bul.—United States Department of Agriculture, Washington, D. C.
- Cy. of Agr.—Cyclopedia of American Agriculture.
- N. J. Exp.—New Jersey Agricultural College, New Brunswick, N. J.
- Mo. Rch. Bul.—University of Missouri, Columbia, Mo.
- Tex. A. & M.—Agricultural and Mechanical College, College Station, Texas.
- Ch.—Chapter.
- Ybk.—Yearbook, U. S. D. A., Washington, D. C.
- Bu. Sts.—Bureau of Statistics, U. S. D. A., Washington, D. C.

2. Additional references for more extensive reading

a. Technical books

- Stein "Cooperative Marketing, The Golden Rule in Agriculture." Doubleday, Page & Co., New York.
- Homer "Agricultural Marketing." John Wiley & Co., New York.
- Howe "Farm Economics." American Book Co., New York.
- Converse "Marketing Methods of Poliaais." Prentice Hall, New York.
- Clark "Principles of Marketing." Macmillan Co., New York.
- Clark "Readings in Marketing." Macmillan Co., New York.
- Benton "Marketing of Farm Products." A. W. Shaw Co., New York.
- Boyle "Marketing of Agricultural Products." McGraw Hill, New York.

b. Popular books

- Bizzell "The Green Rising." Macmillan Co., New York.
 Berry "Farm Woodlands." World Book Co., Yonkers-on-Hudson, New York.
 Babbitt and Wimberley "Essays on Agriculture." Doubleday, Page, Garden City, N. Y.
 Davenport, "The Farm." Macmillan, New York.
 Cheney and Wentling "The Farm Woodlot." Macmillan Co., New York.
 Harap "The Education of the Consumer." Macmillan Co., New York.
 Ivins and Winship "Fifty Famous Farmers." Macmillan Co., New York.
 Larmer "Financing the Livestock Industry." Macmillan Co., New York.
 Campbell "Rural Life at the Cross Roads." Ginn & Co., New York.
 Warbasse "Cooperative Democracy." Macmillan Co., New York.
 Schmidt and Ross "Reading in the Economic History of American Agriculture." Macmillan Co., New York.

c. Bulletins

- Howe "Farm Economics." American Book Co., New York.
 Federal Bureau of Farm Management, Washington, D. C.

d. Magazines

- The Cooperative Marketing Journal, 1133 Investment Bldg., Washington.
 Farm Economics. Department of Agr. Ec. and Farm Man., Cornell University, Ithaca, N. Y.
 Market News Service. Bureau of Agr. Ec., Washington, D. C.
 Bureau of Marketing, Washington, D. C.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Making local agricultural surveys
2. Completion of farm account projects begun the preceding year in the farm management class
3. Assisting in organizing and conducting local marketing associations

F. CORRELATED LABORATORY EXERCISES, PRACTICUMS, DEMONSTRATIONS AND FIELD TRIPS

1. Plotting price curves for each of the different farm animals and farm crops
2. Visits to nearby markets for the purpose of observing methods of marketing
3. Comparing prices received through cooperative and regular marketing.
4. Marketing livestock or crops
5. Observing different methods of transporting farm produce
6. Comparing prices on graded and ungraded farm produce
7. Visiting packing sheds in order to observe methods used
8. Comparing prices received through direct and indirect method of selling

9. Making studies as to the effect of the different laws on agriculture
10. Grading produce for markets
11. Making studies as to the effect of pure-bred animals on economic values

G. CORRELATED FARM SHOP

NOTE: Farm shop work correlating with Farm Economics will be included under the outline on Farm Equipment.

H. CORRELATIONS WITH OTHER HIGH SCHOOL SUBJECTS

1. English—debates on such topics as:
 - a. Resolved, That a young man, desiring to begin farming, should borrow the necessary capital instead of working for wages.
 - b. Resolved, That the cooperative selling of farm produce is more profitable than selling direct to local buyers.
2. Mathematics
 - a. Compiling marketing data
 - b. Estimating market demands
3. Drawing
 - a. Developing price curves
 - b. Preparing graphs showing agricultural development
4. Science
 - a. Methods of storing and shipping fruits
 - b. The construction of grain elevators
5. History
 - a. The effect of cooperative marketing on the development of American agriculture
 - b. The relation of present day marketing systems to the development of agriculture in foreign countries

III Equipment and Materials

- A. EQUIPMENT—see outline on Farm Equipment Enterprise
- B. MATERIALS—charts and maps invaluable in the teaching of Farm Economics may be secured from:
 1. Armour & Co., Chicago (product maps)
 2. Federal Land Bank, Baltimore (charts)
 3. Bureau of Marketing, U. S. D. A., Washington, D. C.

IV Evidences of the Achievement of Goals

- A. MEMBERS OF THE GROUP ESTABLISHED IN THE ECONOMICAL PRODUCTION OF FARM ANIMALS AND CROPS
- B. LOCAL MARKETING ASSOCIATIONS ACTIVELY PARTICIPATED IN BY FORMER MEMBERS OF THE GROUP WHO COMPLETED THE COURSE IN FARM ECONOMICS
- C. LOCAL GRADING CENTERS ESTABLISHED AND CONDUCTED BY FORMER MEMBERS OF THE GROUP
- D. A WHOLESALE ATTITUDE, ON THE PART OF PRODUCERS, TOWARD MARKETS.

COMMUNITY SPECIALTIES

One or more of the following units may be offered during the fourth year:

- Advanced Dairying
- Advanced Poultry
- Advanced Crops
- Truck Growing
- Fruit Production
- Small Fruits and Vines
- Landscape Gardening, including Floriculture
- Tuber Crops
- Rural Law
- Farm Accounts
- Cooperative marketing
- Advanced Swine Production
- Any other major community enterprise

FARM EQUIPMENT ENTERPRISE

I Goals of Achievement

- A. To give ability to plan farm building
- B. To give skill in constructing small buildings
- C. To give knowledge of such farm equipment as is needed on a typical farm
- D. To develop skill in operating farm machinery
- E. To develop appreciations for up-to-date farm equipment
- F. To cultivate habits of caring for farm buildings and equipment
- G. To develop the ability to select and purchase machinery, intelligently

II Activities Through Which Goals May Be Achieved

A. THE PRELIMINARY SURVEY

1. The necessity for modern farm buildings
2. The development of farm machinery
3. The need for up-to-date machinery
4. The use of machinery on typical farms of the community
5. The need for instruction on farm equipment

B. BY LISTING THE PRINCIPAL JOBS

1. Constructing buildings
2. Making buildings sanitary
3. Equipping building
4. Lighting buildings
5. Providing water
6. Painting buildings
7. Fencing
8. Selecting machinery
9. Setting up machinery
10. Using machinery
11. Caring for machinery
12. Selecting motors
13. Using motors
14. Laying tile drain
15. Using rope on the farm
16. Constructing private roads

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|---|---|
| 1. Constructing buildings..... | (a) Buildings needed; (b) locating; (c) drawing plans; (d) materials of construction; (e) estimating materials necessary; (f) factors involved in construction. |
| <i>References: R.</i> , pp. 20-49, 73-99; <i>D.</i> , pp. 395-479; <i>S.</i> , pp. 4, 5, 131; <i>Rl.</i> , pp. 240-260; <i>Sm.</i> , pp. 33-59. | |
| 2. Making buildings sanitary. | (a) Locating; (b) lighting; (c) ventilating; (d) sewage disposal; (e) disinfecting; (f) whitewashing. |
| <i>References: F. B.</i> 941; <i>R.</i> , pp. 230-244; <i>D.</i> , pp. 480-536; <i>R. B.</i> , pp. 426-441; <i>Sm.</i> , pp. 233-260. | |
| 3. Equipping building..... | (a) Locating equipment; (b) convenience; (c) materials to be used; (d) care of equipment. |
| <i>References: R. B.</i> , pp. 114-163; <i>Sm.</i> , pp. 1-7, 68-182. | |
| 4. Lighting buildings | (a) Natural; (b) artificial. |
| <i>References: R.</i> , pp. 100-144. | |
| 5. Providing water | (a) Sources; (b) equipment adopted locally. |
| <i>References: R.</i> , pp. 145-229; <i>R. B.</i> , pp. 351-425. | |
| 6. Painting of farm buildings. | (a) Necessity for; (b) kinds of paints adapted; (c) desirable colors; (d) applying. |
| <i>References: Sm.</i> , pp. 183-196; <i>Rl.</i> , pp. 402-6; <i>S.</i> , pp. 50-55; <i>R. B.</i> , pp. 194-209; <i>F. B.</i> 1452. | |

7. Fencing(a) Types adapted locally; (b) constructing; (c) repairing.
References: R., pp. 59-72.
8. Selecting machinery.....(a) Types adapted to local conditions; (b) personal preferences; (c) availability of repairs; (d) initial outlay necessary.
References: D., pp. 180-308; *R.*, pp. 245-428; *Md.* 33.
9. Setting up machinery.....(a) Executing directions.
References: Commercial Publications.
10. Using machinery.....(a) Adjusting; (b) lubricating; (c) observing.
References: Md. 33.
11. Caring for machinery when not in use(a) Repairing; (b) painting before storing; (c) storing.
References: D., pp. 309-312; *S.*
12. Selecting motors.....(a) Types adapted locally; (b) availability of accessories; (c) capital available.
References: D., pp. 313-349; *R.*, pp. 429-476.
13. Using motors.....(a) Necessity for lubricating; (b) adjusting properly; (c) inspection; (d) overhauling.
References: D., pp. 350-395; *F. Buls.* 946 and 947.
14. Laying tile drain.....(a) Determining the necessity for; (b) surveying; (c) system adapted locally; (d) executing.
References: R. B., pp. 210-292; *D.*, pp. 16-108.
15. Using rope on the farm.....(a) Tying knots; (b) splicing.
References: Sm., pp. 272-297; *R. B.*, pp. 49-113; *D.*, pp. 537-546; *R.*, pp. 477-518; *S.*, pp. 342-352; *RL.*, pp. 317-356.
16. Constructing private roads.(a) Kinds adapted locally; (b) constructing; (c) maintaining.
References: D., pp. 141-175; *F. Buls.* 338, 597.

D. READINGS

1. Legend to instructional material

a. Books

- F. B.—Farmers' Bulletins. U. S. D. A., Washington, D. C.
 Md.—University of Maryland, College Park, Md.
 D.—Davidson "Agricultural Engineering." Webb Pub. Co. St. Paul, Minn.
 R.—Ramsower "Equipment for the Farmstead." Ginn & Co., New York.
 R. B.—Robb and Behrends "Farm Mechanics." John Wiley & Sons, New York.
 RL.—Roehl "Farmers' Shop Book." Bruce Pub. Co., Milwaukee, Wis.

- S.—Struck "Construction and Repair Work for the Farm."
Houghton, Mifflin Co., New York.
Sm.—Smith "Agricultural Mechanics." Lippincott Co., Philadelphia.

b. Bulletins

- U. S. D. A., Washington, D. C.
University of Maryland, College Park, Md.
Different State agricultural colleges — see complete list in
Storm and Davis, pp. 416-417.
See Bul. 17, University of California, Berkeley, Cal., for a
detailed list of references.

c. Books for more extensive reading

- Foster and Carter "Farm Buildings." John Wiley & Sons,
New York.
Stewart "Engineering on the Farm." Rand, McNally Co.,
New York.
Sabin "House Painting." John Wiley & Sons, New York.
Jeffrey "Wood Finishing." Manual Arts Press, Peoria, Ill.
Hobbs-Elliott "The Gasoline Automobile." McGraw Hill,
New York.

d. Magazines

- Farm Mechanics. Chicago, Ill.
Manufacturers' Record, Baltimore, Md.

E. TYPICAL SUPERVISED PRACTICAL WORK

1. Installing water or lighting system in farm home
2. Constructing a hog or chicken house
3. Repairing and painting buildings on home farm
4. Preparing machinery for winter storage

F. CORRELATED LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS,
FIELD TRIPS AND FARM SHOP WORK

NOTE: Since practically all of the jobs listed under II B should be taught largely through laboratory exercises, farm shop work, etc., no attempt has been made to set up additional lists.

III Equipment and Materials

1. Charts from John Deere Plow Company, Moline, Ill.
2. International Harvester Company of America, 506 S. Michigan Ave., Chicago, Ill.
3. See p. 8, Davidson "Agricultural Engineering and Farm Mechanics" for detailed list of manufacturers of farm machinery, from which catalogues and charts, when available, should be secured.
4. Charts. New Idea Spreader Company, Coldwater, Ohio.
5. Charts. J. I. Case Threshing Machine Co., Racine, Wis.
6. Farm machinery at local dealers, for observation and setting up exercises.

IV Evidences of Achievement of Goals

- A. PUPILS CAPABLE OF SETTING UP FARM MACHINERY
- B. PUPILS ACTUALLY OPERATING FARM MACHINERY
- C. CARING FOR AND STORING FARM MACHINERY WHEN NOT IN USE
- D. ABILITY IN SELECTING FARM MACHINERY, DEMONSTRATED

FARM SHOP ENTERPRISE

I Goals of Achievement

- A. Constructing and repairing those things which are of the greatest importance on the average farm, keeping in mind the facilities and equipment on hand with which to do shop work
- B. Developing skill in the proper use of tools
- C. Giving such knowledge as will be helpful in the selection of tools
- D. Each boy should be encouraged to have the best farm shop possible on his home farm
- E. Each year's farm shop work should correlate with the subject matter teaching content for that particular year

II Activities Through Which the Goals May Be Achieved

A. THE PRELIMINARY SURVEY

1. The teacher should explain the purposes and objectives of farm shop work, and give specific instructions as to use of the farm shop room, and care of tools
2. Analysis of jobs to be completed

B. BY LISTING THE PRINCIPAL JOBS

1. Planning and drafting
2. Selecting tools for school and home farm shop
3. Using tools
4. Sharpening tools
5. Woodworking
6. Staining, varnishing and painting
7. Repairing
8. Tying knots and splicing rope
9. Soldering
10. Working with cold metal
11. Fitting pipe

C. THROUGH FARM SHOP INSTRUCTION

<i>Job</i>	<i>Teaching Content</i>
1. Planning and drafting.....	(a) Drawing instructions; (b) reading of drawings; (c) drawing of articles, such as feeders, and buildings, such as poultry and hog houses to be constructed.
<i>References: S., pp. 333-41.</i>	
2. Selecting tools and equipment for school and home farm shop.....	(a) Kinds adapted; (b) study of catalogues; (c) funds available; (d) tools for the home farm shop.
<i>References: S., pp. 9-26, 297-331.</i>	
3. Using tools.....	(a) Care of shop room and tools; (b) adjustment.
<i>References: S., pp. 12-26</i>	
4. Sharpening tools.....	(a) Filing saws; (b) sharpening of chisels, planes, knives, etc., brought to school from home farms.
<i>References: S., pp. 27-38.</i>	

5. Woodworking (a) Study of woods available; (b) construction of articles and buildings from drawings made under C 1-c. See farm enterprise outlines for additional articles to be made, and buildings to be constructed.
References: *R. B.*, pp. 210-19; *Rl.*, pp. 240-60; *S.*, pp. 64-296.
6. Staining, varnishing and painting (a) Kinds of materials adapted; (b) methods of applying.
References: *Rl.*, pp. 402-6; *R. B.*, pp. 194-209; *S.*, pp. 50-55.
7. Repairing (a) Machinery; (b) buildings; (c) harness; (d) miscellaneous articles; (e) lacing belts, repairing pulleys and chains.
References: *R. B.*, pp. 1-45, 114-163; *S.*, pp. 353-368.
8. Tying knots and splicing rope (a) Knots adapted to local needs; (b) typical splices.
References: *R. B.*, pp. 49-113; *S.*, pp. 342-352.
9. Soldering (a) Principles involved; (b) methods; (c) the making of such simple articles as will develop the technique; (d) repairing articles brought from homes.
References: *R. B.*, pp. 164-193.
10. Working with cold metal..... (a) Characteristics of steel, wrought iron, cast iron, etc.
11. Fitting pipe (a) Principles to be observed; (b) kinds adapted locally.
References: *S.*, pp. 11, 21, 42-44.

D. READINGS

1. Legend to instructional material
Rl.—Roehl "Farmers' Shop Book." Bruce Pub. Co., Milwaukee, Wis.
R. B.—Robb and Behrens "Farm Mechanics." John Wiley & Sons, New York.
S.—Struck "Construction and Repair Work for the Farm." Houghton, Mifflin Co., New York.
U. of Cal. Bul. 17—University of California, Berkeley, Cal. See pp. 62-72 of this bulletin for a detailed list of Farm Shop references.
2. Additional references for more extensive reading
Circular 131—University of Missouri, Columbia, Mo.
Agr. Ed. Bul. 1—State Department of Public Instruction, Raleigh, N. C.
Agr. Ed. Bul. 3—College of Agriculture, Knoxville, Tenn.
F. B.—Farmers' Bulletin, U. S. D. A., Washington, D. C.
Bulletins and circulars—Office of Publications, College of Agriculture, Ithaca, N. Y.
Schmidt, Ross and Sharp—Teaching Farm Shop Work and Farm Mechanics. The Century Co., New York.

- b. Magazines
 - Farm Mechanics, Chicago, Ill.
 - Manufacturers' Record, Baltimore, Md.
- c. Charts—Atkins & Co., Indianapolis, Ind.
 - The Stanley Rule and Level Company, New Britain, Conn.
 - Henry Disston Co., Philadelphia, Pa.
 - Simmonds Mfg. Co., Fitchburg, Mass.
 - Rope Charts—Columbia Rope Co., 354 Genessee St., New York; Whitlock Cordage Co., New York.

III Equipment

A. FARM SHOP EQUIPMENT SUGGESTED FOR EACH TWELVE BOYS

1. *For woodwork*
 - 1 large steel square
 - 1 rip-saw
 - 2 cross-cut saws
 - 2 drawing knives
 - 3 screwdrivers
 - 3 wood rasps
 - 6 6" squares
 - 1 carborundum bench grinder
 - 6 small files for saw sharpening
 - 6 claw hammers
 - 1 hatchet
 - 2 T-bevels
 - 1 pair pliers
 - 6 block planes
 - 6 smoothing planes
 - 2 Jack planes
 - 2 nail sets
 - 1 compass saw
 - 3 back saws
 - 4 wood mallets and a set of chisels
 - 1 putty knife, sandpaper, putty, nails, screws and brads of various sizes
2. *For staining, varnishing and painting*
 - 6 3" brushes
 - stain, varnish, paints, linseed oil, and liquid wood filler
3. *Repairing*
 - a. *For harness repair*
 - 1 automatic awl with needles
 - 1 belt awl
 - 1 rivet set and header
 - 1 set of drive punches and rivets
 - 1 straight leather knife
 - 1 round leather knife
 - b. *For belt lacing, repairing pulleys and chains—*
 - belts of different types and belt lacing to be used in lacing exercises; various kinds of pulleys; gears and sprocket chains
4. *For rope work—*
 - about 100 ft. of $\frac{1}{2}$ " or $\frac{3}{4}$ " three strand rope to be used in splicing and knot tying

5. *For soldering*

- 1 blow torch
- 2 soldering irons
- 1 bar of solder
- 1 pair tin snips—
- sheets of tin, flux, hammer for riveting, and rivets

6. *For cold metal work*

- 1 hack saw
- 3 cold chisels
- 1 set screw plates, taps and dies
- 2 10" monkey wrenches
- 2 center punches
- 1 power drill and set of bits
- 1 anvil
- 1 1½ lb. hammer

7. *For pipe fitting*

- 1 pipe cutter—capacity, ½"-2½"
- 1 oiler
- 1 stock and die
- 1 vise—capacity ⅛"-2½"
- 2 12" Stillson wrenches
- 1 reamer

B. MATERIALS—See Struck, pp. 39-63

*E. and F.—NOTE: Since farm shop work will consist almost entirely of laboratory work, no separate lists of correlated and supervised practical work have been set up

G. See G. under each farm enterprise outline for correlated farm shop work

* C and D omitted.

IV Evidences of Achievement of Goals

- A. FORMER PUPILS ABLE TO DO THE NECESSARY SHOP WORK ON THE HOME FARM
- B. DEMONSTRATED SKILL IN CONSTRUCTING SIMPLE BUILDINGS
- C. A FARM SHOP ON THE FARM OF EACH PUPIL COMPLETING AN AGRICULTURAL COURSE
- D. THE COMPLETION OF SUCH CORRELATED FARM SHOP WORK AS HAS BEEN LISTED UNDER DIFFERENT FARM ENTERPRISES
- E. REPAIR WORK BEING DONE BY FORMER PUPILS ON THE FARM

CONCRETE ENTERPRISE

I Goals of Achievement

- A. Skill in mixing concrete
- B. Ability to mix concrete economically
- C. The forming of habits of accuracy in computing mixes
- D. The creating of an attitude of interest in local, farm and farm home improvements
- E. The development of an appreciation of neat, permanent, firesafe, and economical improvements on the home farm

II Activities Through Which the Goals May Be Achieved

A. PRELIMINARY STUDY

1. The place of cement manufacturing in industry
2. The adaptability of concrete to: (a) agriculture; (b) engineering; (c) building; (d) art
3. Advantages of a thorough knowledge of concrete
4. Need for firesafe and fireproof buildings
5. Need of farm improvements—(a) provision for economical and firesafe storage of crops; (b) equipment necessary for the production of marketable milk; (c) farm home conveniences.
6. Concreting as a business

B. BY LISTING PRINCIPAL JOBS

1. Securing a knowledge of materials
2. Proportioning and mixing
3. Placing and curing
4. Determining factors in strength of concrete
5. Testing of concrete and materials
6. Reinforcing concrete
7. Making forms
8. Surfacing and finishing
9. Reading plans

C. THROUGH CLASSROOM INSTRUCTION

- | <i>Job</i> | <i>Teaching Content</i> |
|--|--|
| 1. Securing a knowledge of materials | (a) Portland cement—definition; history, development, properties; (b) aggregates—classification, sand, stone, pebbles, cinders, slag; (c) condition of aggregates—moisture content and bulking of sand, freedom from organic material; (d) kind of water.

<i>References:</i> P. C. A.—E. 101; P. C. A.—M. 1; H. P. 5; P. C. A.—T. 12, M. 1; H. P., pp. 8-12; P. C. A.—T. 12; H. P., p. 195; F. B. 1279; R. B., pp. 329-337, |
| 2. Proportioning and mixing | (a) Principles of proportioning; (b) mixtures; (c) water-cement ratio; (d) hand-mixing; (e) machine mixing; (f) speed and time of mixing; (g) relation of workability to use of concrete in—thin walls, reinforced concrete, mass concrete, roads, floors.

<i>References:</i> P. C. A.—T. 12; P. C. A.—M. 1; H. P., p. 51 and 55; R. B., pp. 338-347. |
| 3. Placing and curing concrete | (a) Setting of cement; (b) transporting fresh concrete; (c) tamping; (d) spading; (e) setting of concrete; (f) protection; (g) concreting in cold weather.

<i>References:</i> H. P., pp. 61, 66, 68, 69, 85; P. C. A.—M. 1, F. 115, P. 16, M. 4, T. 12. |

4. Determining factors in strength of concrete.....(a) Amount of cement; (b) amount of water; (c) time of mixing; (d) quality and grading of aggregate; (e) method of curing; (f) effect of substances on concrete.
References: *P. C. A.*—*T. 12, M. 1; H. P.*, p. 23; *F. B.* 1279.
5. Testing of concrete and materials(a) Silt test; (b) colorimetric test; (c) slump test; (d) tension and compression tests.
References: *P. C. A.*—*M. 1, T. 12; H. P.*, p. 193, 194, 212, 213.
6. Reinforcing concrete.....(a) Concrete strength in compression; (b) necessity for reinforcing (c) reinforcing materials; (d) practical examples; (e) engineering advice needed.
References: *H. P.*, p. 211, 158; *P. C. A.*—*M. 1; R. B.*, p. 349.
7. Making forms.....(a) Types; (b) materials; (c) costs; (d) preparation; (e) erection; (f) removal of forms; (g) special forms; (h) commercial forms.
References: *H. P.*, pp. 77-96; *P. C. A.*—*M. 1; F. B.* 1279; *R. B.*, pp. 294-327.
8. Surfacing and finishing.....(a) Floated surface; (b) tooled surface; (c) scrubbed or polished surfaces; (d) surface mixtures; (e) special aggregates; (f) colors in surfaces; (g) stucco and its application.
References: *P. C. A.*—*M. 1; P. C. A.*—*P. 6; F. B.* 1279.
9. Reading plans.....(a) Blueprints; (b) specifications.
References: *H. P.*, p. 139.

D. READINGS

1. Legend to instructional material
 - F. B.*—Farmers' Bulletin, U. S. D. A., Washington, D. C.
 - H. P.*—"Concrete Practice," Hool and Pulver, McGraw Hill Book Company, New York.
 - P. C. A. Bul.*—Bulletins published by the Portland Cement Association; nearest office, Philadelphia, Pa.
 - E. 101*—Highlights on the Portland Cement Industry.
 - T. 12*—Design and Control of Concrete Mixtures.
 - F. 17*—Permanent Repairs on the Farm.
 - F. 18*—Plans for Concrete Farm Buildings.
 - M. 1*—Vocational Course in Concrete.
 - F. 115*—Cold Weather Need Not Delay Your Improvements.
 - P. 16*—Winter Construction with Concrete.
 - M. 4*—Concreting in Cold Weather.
 - P. 6*—Stucco Surfacing with Portland Cement.
 - F. 4*—Concrete Fence Posts.
 - F. 3*—101 Farm Uses of Concrete.
 - F. 5*—Concrete Around the Home.
 - F. 114*—Increased Profits with Feeding Floors.
 - F. 102*—Suggested Plans for Milk Cooling Houses.
 - R. B.*—Robb and Behrends "Farm Mechanics." John Wiley & Sons, New York.

2. Additional references for more extensive reading

Portland Cement Association Bulletins; nearest office, Philadelphia, Pa.:

Standard Specifications and Tests for Portland Cement
 Concrete Floors
 Concrete Sidewalks
 Concrete Swimming Pools
 Tennis Courts for All Year Sport
 Facts About Concrete Roads
 Equipment and Methods for Modern Highway Building
 Pavements for Modern Traffic
 Charted Summary of Concrete Road Specifications
 Concrete in Home Sanitation
 Foundation Walls and Basements of Concrete
 Concrete Tile for Land Drainage
 Concrete Garages
 Concrete Masonry Construction
 Winter Construction with Concrete Masonry
 Book of Beautiful Homes
 Concrete Silos

Books

Baxter "Elementary Concrete Construction." Bruce Pub. Co., Milwaukee, Wis.
 Campbell "Practical Concrete Work for the School and Home." Manual Arts Press, Peoria, Ill.
 Ekblaw "Farm Concrete." Macmillan Company, New York.
 Ransower "Equipment for the Farm and Farmstead." Ginn & Co., New York.
 Smith "Agricultural Mechanics." Lippincott Co., Philadelphia, Pa.

E. TYPICAL SUPERVISED PRACTICAL AND FARM SHOP CONSTRUCTION OF:

1. Sidewalks	<i>References: P. C. A. M.-1</i>		
2. Steps	"	"	M.-1
3. Barn and poultry house floors	"	"	F.-18
4. Well platforms and curbs	"	"	F.-17
5. Fence, clothesline and mailbox posts	"	"	F.-4, M.-1, F.-17
6. Water tanks	"	"	F.-5
7. Engine foundations	"	"	M.-1
8. Hotbeds	"	"	M.-1
9. Feeding floors	"	"	F.-114
10. Milk houses	"	"	F.-102
11. Garages	"	"	F.-5
12. Refuse burners	"	"	F.-5
13. Porches	"	"	F.-3
14. Garbage stands	"	"	F.-5
15. Lawn rollers	"	"	M.-1
16. Smoke houses	"	"	F.-5

F. and G. LABORATORY EXERCISES, PRACTICUMS, OBSERVATIONS, FIELD TRIPS, AND FARM SHOP WORK

1. For use of class as a whole
 - a. Screening gravel and placing in bins
 - b. Oiling forms
 - c. Making silt and colorimetric tests
 - d. Making trial mixes to show workability
 - e. Making the slump test

2. Individual exercises
 - a. Door weight or brick
 - b. Tea tile
 - c. Baseball home plate
 - d. Chimney cap
 - e. Book ends
 - f. Foot scraper
 - g. Flower box or bulb tray
 - h. Hand tamper
3. Field trips
 - a. Visit to a concrete products plant
 - b. Visit to a construction job to note reinforcing
 - c. Visit to a road job to note curing

III Equipment and Materials

- A. ROOM AND SPACE REQUIRED—See P. C. A. M.-1
B. EQUIPMENT—See P. C. A. M.-1
C. MATERIALS—See P. C. A. M.-1

IV Evidences of Achievement of Goals

- A. SKILL IN DESIGNING AND MIXING CONCRETE ECONOMICALLY
B. ABILITY TO PLAN CONCRETE IMPROVEMENTS
C. ABILITY TO APPLY KNOWLEDGE TO FARM BUILDING CONSTRUCTION

MISCELLANEOUS MATERIAL AND EXHIBITS OTHER THAN THOSE LISTED IN FARM ENTERPRISE OUTLINES

1. Booklets

- a. Different Crops. Virginia-Carolina Chemical Company, Richmond, Va.
- b. Keeping Track of the Farm Dollar. John Deere, Moline, Ill.
- c. Varieties of Grapes. T. S. Hubbard, Fredonia, N. Y.

2. Bulletins

- a. Agricultural Evening Classes—State Board for Vocational Education, Fort Collins, Col.; Bul. 89, Federal Board for Vocational Education, Washington, D. C.
- b. Agricultural Evening School Classes in Dairying—Bul. 199, State Board for Vocational Education, Austin, Texas.
- c. Country Life Program—Circular 65, West Virginia Department of Agriculture, Morgantown, W. Va.
- d. Community Organization — Publication 99, College of Agriculture, Knoxville, Tenn.
- e. Experiment Station List—See Storm and Davis, pp. 416-417 for list of Experiment Stations.
- f. Farm Accounts—Ohio State University, Columbus, Ohio
- g. Agricultural Education—Buls. 13, 21, 26, 27, 53, 56, 68, 74, 81, 82, 83, 84, 88, 89, 90, 91, 98, 100, 101 and 103 Federal Board for Vocational Education, Washington, D. C.
- h. International Harvester—International Harvester Co., Chicago, Ill.
- i. International Stock Food — International Stock Foods Co., Minneapolis, Minn.

j. Projects in Vocational Agriculture—The Home Project in Vocational Agriculture, Bul. 22, State Bd. for Vocational Education, Springfield, Ill.; The Project in Education with Special Reference to Teaching Agriculture—Ed. Research Cir. 24, U. of Illinois, Urbana, Ill.

k. Surveys—

- (1) Rural Population Groups—Research Bul. 74, College of Agriculture, Columbia, Mo.
- (2) Uses of the Farm Survey in Teaching Agriculture—Bul. 4, Clemson Agricultural College, Clemson, South Carolina.
- (3) A Survey of the Wrens School Community—Bul. 314, Ga. State College of Agriculture, Athens, Ga.

l. U. S. D. A., Washington, D. C.—Division Bulletins

- (1) Agricultural Education
- (2) Crops and Markets
- (3) Cooperative Extension Service
- (4) Cooperative Marketing
- (5) Office of Experiment Station
- (6) Office of Information

m. University of Maryland, College Park

- (1) Experiment Station—Nos. 1-250
- (2) Extension Service—Maryland Invites You—Bul. 18, and others
- (3) Miscellaneous Agricultural College Bulletins

NOTE: See pp. 249-253 Schmidt "New Methods in Teaching Vocational Agriculture," The Century Co., New York, for additional list of materials

n. Miscellaneous—Superintendent of Documents, Washington, D. C.

3. *Catalogues*

a. Lantern, slides and films

- (1) Bausch & Lomb Optical Co., Rochester, N. Y.
- (2) DeVry Corporation, Chicago, Ill.
- (3) Keystone View Company, Meadville, Pa.
- (4) Office of Agricultural Instruction, U. S. D. A., Washington, D. C.
- (5) Soil Improvement Committee, National Fertilizer Association, Washington, D. C.
- (6) Spencer Lens Co., Buffalo, N. Y.
- (7) Victor Animatograph Co., Davenport, Iowa

4. *Laboratory Manuals*

- a. Waters-Elliff—Agricultural Laboratory Exercises and Home Projects (Revised Edition). Ginn & Co., New York.
- b. Schmidt—Laboratory, Field and Project Guide to Agriculture. D. Appleton & Co., New York.

5. *Laboratory Supply Companies' Addresses*

- a. Central Scientific Co., Chicago, Ill.
- b. Kauffman-Latimer Co., Columbus, Ohio.
- c. W. M. Welch Scientific Co., Chicago, Ill.

CHAPTER V

SUPERVISION AS A MEANS OF INCREASING THE EFFICIENCY OF INSTRUCTION IN VOCATIONAL EDUCATION IN AGRICULTURE

Some Characteristics of Effective Supervision

Effective supervision is characterized by a realization that the teacher and supervisor should share alike, the responsibility for:

1. The setting up of definite goals of achievement. That this principle has been adhered to in the preparation of this publication is evidenced by the fact that the goals of achievement for each unit of subject matter outlined have been agreed to by the combined membership of all committees of teachers. (Exhibit B).*

2. Finding the conditions affecting learning for individual pupils enrolled. The making of local agricultural surveys has done much to assist teachers in studying the local conditions as they effect learning.

3. Deciding upon the teaching content. The outlines of teaching content as given in Chapter IV should, if followed, assist teachers materially in deciding upon the teaching content for each unit.

4. Selecting materials and methods necessary for effective instruction. The publication deals almost exclusively with suggestions which, if observed, will secure materials and methods necessary for effective instruction in agriculture.

5. Providing the type of instruction that will endeavor to educate each pupil up to capacity. In order to ascertain the capacities and the level of attainment for each individual pupil, the following standard tests have been given by all teachers, under the direction of the writer acting as supervisor.

- a. Farm Crops Information Test—Forms A and B (Exhibit H)*
- b. Thorndike-McCall Reading Scale—Form 4 (Exhibit I)*

* For statement relative to availability of Exhibit, see page 4.

The Need for a Sound Basis for Evaluating the Efficiency of the Instruction in a Department of Vocational Education in Agriculture

No problem in agricultural education is more acute throughout the United States than is the problem of determining a sound basis for and evaluating the instruction of departments of vocational education in agriculture. Following the passage of the Smith-Hughes law in 1917, the states began to make plans for the immediate use of the large amounts of Federal aid available for instruction in vocational education in agriculture in schools of secondary grade. As a result, some of the instruction has not been up to the standard.

Ten years of experience in State supervision of agricultural education led to the conclusion that the chief weaknesses in instruction in vocational education in agriculture are:

1. The lack of definite preparation for such instruction on the part of teachers for the following reasons:—

- a. Physical conditions unattractive
- b. Lack of organization in teaching content
- c. Lack of definite aims and objectives
- d. Materials inadequate or inaccessible

2. Inefficient classroom procedure

- a. Assignments ineffective
- b. Directed study lacking in definite purpose
- c. Recitations lacking in enthusiasm

3. Inadequate results

- a. Limited amount of subject matter mastered
- b. Applications ineffective

If teachers are to improve, they must first analyze their instruction and realize their respective weaknesses. To meet this need a form to be used as a basis of evaluating the efficiency of instruction in vocational education in agriculture was prepared.

Procedure Followed in Determining a Basis for Evaluating Instruction in Maryland Departments

Growing out of a need for a sound basis for evaluating the instruction in departments of vocational education in agriculture in Maryland, the procedure given below was begun in September, 1925, under the direction of Dr. Florence E. Bamberger, Professor of Education, Johns Hopkins University.

1. A summary study of the methods of evaluating the instruction in departments of vocational education in agriculture proposed by the State Departments of Education in other states was made, as was also a study of all additional available literature dealing with the topic.

2. The items to be used as a basis for evaluating instruction were listed by the supervisor in conference with teachers of vocational education in agriculture throughout Maryland.

3. Conferences on the proposed basis for evaluating instruction were held with representatives of the Federal Board for Vocational Education and with the Professor of Agricultural Education at the University of Maryland.

4. Each of the following persons to whom the "Basis Proposed for Evaluating Instruction" was sent in the tentative mimeographed form was requested to estimate the weight of each item on the basis of 100 points.

- a. Fifty State Supervisors of agricultural education in the United States
- b. Fifty professors of agricultural education throughout the United States
- c. Each of the white teachers of vocational education in agriculture in the twenty-nine Maryland departments

5. Sixty-two copies of the score card were returned by:

- a. Twenty-three State supervisors of agricultural education
- b. Fourteen professors of agricultural education
- c. Twenty-five of the white teachers of vocational education in agriculture in Maryland

The following Basis for Evaluating the Efficiency of Instruction in Vocational Education in Agriculture for Maryland was obtained after tabulating the weights estimated for the various items by the 62 men who returned the score cards. In arriving at the composite of the estimated weights, the opinions of each of the 62 persons were considered of equal rank.

Basis Adopted for Evaluating Instruction

RATINGS

1. Previous preparation by teacher

a. Condition of room—ventilated, light, clean and orderly

b. Lesson plan

(1) Aim—specific

(2) Proposed procedure—adaptability of method, devices, etc.

(3) Selection of material—seasonal, adapted and amount

(4) References and materials—number, availability

(5) Teacher's previous preparation, as shown during recitation

2. Classroom procedure

a. Assignment—motivation and difficulty

b. Supervised study—assistance rendered and effectiveness

c. Recitation—skill of teacher shown in questioning, handling pupils and contributions, stimulating pupils, clinching facts, summarizing, testing, applying, etc.

3. Results accomplished—new knowledge gained and aims accomplished

Total Points

Standard	Teacher	Supervisor	Agreed
8			
7			
6			
7			
6			
8			
10			
10			
14			
24			
100			

Name of Teacher..... School.....

Date.....

Use Made of the Basis Adopted for Evaluating Instruction

1. Using the proposed basis of evaluating instruction, between November 1 and December 20, 1925, each teacher of vocational education in agriculture in Maryland rated himself and was rated by the supervisor. This was done as a means of stimulating the spirit of self-analysis on the part of the teacher.

2. In November and December, 1925, all pupils enrolled for Plant Production by the white teachers in 29 schools were given the Farm Crops Information Test—Form A—a test standardized nationally.** (Exhibit H.)*

3. The departments of vocational education in agriculture were then divided into two as nearly equivalent groups as possible. In making the division, accessibility to the supervisor was given due consideration.

4. Each teacher in group 1 was visited once each month during January, February, and March, 1926. Each visit consisted of a 90 minute period devoted to observation, and a 45 minute period devoted to conference.

a. Special attention was given to lesson planning

- (1) Eleven of the best plans of lessons observed by the supervisor during November and December, 1925, were mimeographed and, together with special instructions on the value of lesson plans, were submitted to each teacher in group 1 (Exhibit C)*
- (2) Each teacher taught 90 minutes from a lesson plan, prepared by himself, using the eleven lesson plans submitted by the supervisor as a guide
- (3) At the close of the observed lesson, the teacher and the supervisor rated the recitation separately, using the "Basis Adopted for Evaluating Instruction."
- (4) The teacher and the supervisor then compared the scores on the different items as listed. This led to a frank discussion, which usually lasted during the entire 45 minutes set aside as a conference period
- (5) During January a copy of the "Basis Adopted for Evaluating Instruction" was sent each teacher in group 1, with the request that he evaluate five consecutive typical instruction periods thereon and submit it to the supervisor at the end of the five periods. This was done as a means of bringing about a further self-analysis on the part of the teachers in group 1. (See Exhibit D)*

* For statement relative to availability of Exhibit, see page 4.

** National Agricultural Tests, edited by Dr. C. E. Myers, Harrisburg, Pennsylvania.

b. Toward the close of the three months' period of concentrated supervision, a conference for the teachers in group 1 was held. The local teacher of vocational education in agriculture taught a demonstration lesson, using a plan previously prepared after conference with the supervisor. (Exhibit E)*

(1) Teachers in the group had been requested to read references on conducting a typical recitation. This was done in order that each member of the group would make special preparation for the conference and would be familiar with at least one phase of a good recitation

(2) Before the demonstration lesson was taught, attention was directed to the points to be considered in observing a demonstration lesson

(3) After the demonstration lesson had been given, a frank discussion followed

c. Other means of stimulating the teachers of group 1 included such procedures as the keeping of charts on farm skills acquired and the checking of activities completed. (See Exhibits F and G)*

5. During January, February, and March the teachers in group 2 received no special attention.

6. Each of the teachers of the 29 departments in groups 1 and 2 was visited once between April 1 and May 30, 1926.

a. Each teacher was rated, using the "Basis Adopted for Evaluating Instruction." This was the means of estimating the improvement in instruction made in the department between November, 1925, and May, 1926.

7. During May, 1926, each pupil taking the Farm Crops Information Test—Form A—was given Form B—Farm Crops Information Test." (See Exhibits H and I.*)

8. During June, 1926, each pupil taking Forms A and B was given the Thorndike-McCall Reading Scale—Form 4. (See Exhibit I.*)

* For statement relative to availability of Exhibit, see page 4.

FINDINGS AND RESULTS OF EXPERIMENT

Summary on the 221 Pupils of Group 1 and the 217 Pupils of Group 2 who took Farm Crops Information Tests A and B Only*

1. In the Information Tests A and B the 221 pupils in group 1 made 81 per cent more gain than did the 217 pupils of group 2. This improvement is apparently due very largely to supervision, since supervision was the variable.

2. Group 1 teachers taught an average of 2 pupils more than did the teachers of group 2, the averages being 13 for group 2 and 15 for group 1.

3. The teachers in group 1 made an improvement in the Information Tests of 125 per cent more than did the teachers of group 2. This is evidence that teachers in group 1 applied themselves more effectively, making even more improvement in the Information Tests than did the pupils of group 2. The improvement scores for teachers and pupils of group 2 sustain each other. It would seem that there is a mutual relation between growth in teachers and growth in pupils.

4. That the pupils of group 2 had previously had as much experience in agriculture as pupils of group 1 is shown by the result of the Information Test Form A. The 221 pupils of group 1 made an average score of 27, as compared with an average score of 32 made by the 217 pupils of group 2.

5. The teachers of group 1 averaged 95 on Form A of the Information Test, as compared with an average score of 99 for the teachers of group 2. The range in group 1 teachers on the Form A test was from 111 to 48, as compared with a range of from 142 to 75 in group 2. The teachers were grouped according to a geographical location, and largely from a standpoint of convenience on the part of the supervisor.

* Due to the fact that the Thorndike-McCall Reading Scale, Form 4, was not given until June, after many pupils had left school, but 180 of the 221 pupils of group 1 and 159 of the 217 pupils of group 2 taking Farm Crops Information Tests, A. and B, were available.

**Tabulations on the 180 Pupils and 14 teachers of Group 1 and
the 159 Pupils and 15 teachers of Group 2 who took Farm
Crops Information Tests A and B and the Thorndike-
McCall Reading Scale—Form 4.**

TABLE I

SHOWING DISTRIBUTION OF SCORES IN FARM CROPS INFORMATION TESTS

Form A	Group 1	Group 2	Form B	Group 1	Group 2
0- .9	2	.....	0- .9	.....	.....
1- 4.9	1	2	1- 4.9	.....	.....
5- 9.9	5	9	5- 9.9	.....	.....
10-14.9	13	7	10-14.9	4	2
15-19.9	13	11	15-19.9	7	7
20-24.9	15	16	20-24.9	10	3
25-29.9	30	13	25-29.9	11	11
30-34.9	30	25	30-34.9	9	14
35-39.9	23	12	35-39.9	17	11
40-44.9	24	13	40-44.9	19	14
45-49.9	24	12	45-49.9	21	14
50-54.9	8	8	50-54.9	15	17
55-59.9	7	12	55-59.9	15	10
60-64.9	.....	7	60-64.9	14	14
65-69.9	.....	4	65-69.9	9	12
70-74.9	.....	4	70-74.9	6	8
75-79.9	.....	1	75-79.9	7	5
80-84.9	.....	3	80-84.9	5	6
85-89.9	.....	.....	85-89.9	10	2
90-94.9	.....	.....	90-94.9	1	4
95 or more	.....	.....	95 or more	.....	5
Total	180	159	Total	180	159
Mean Score	32.1	36.6	Mean Score	51.1	51.5
Standard			Standard		
Deviation	12.65	18.07	Deviation	18.85	20.15

TABLE II

SHOWING THE RESULTS IN GROUPS 1 AND 2 FOR PUPILS WHO TOOK THE FARM CROPS INFORMATION TESTS FORMS A AND B, AND THE THORNDIKE-McCALL READING SCALE FORM 4

Group	No. of Pupils Taking 2 Farm Crops and Reading Tests	FARM CROPS INFORMATION TEST			THORNDIKE-McCALL READING SCALE—FORM 4		
		Average Score Form		Average Improvement	Age in Mos.	T Score	Reading Quotient
		A Nov. 1925	B May 1926				
1	180	32.1	51.1	19.0	184.1	56.4	90.5
2	159	36.6	52.1	15.5	189.6	55.4	89.9

TABLE III

SHOWING THE RESULTS OF THE FARM CROPS INFORMATION TESTS—FORMS A AND B, AND THE THORNDIKE-McCALL READING SCALE—FORM 4 AND THE RELATIVE IMPROVEMENT MADE BY TEACHERS IN GROUPS 1 AND 2

Group	IMPROVEMENT AS SHOWN BY FARM CROPS INFORMATION TESTS			Teacher Improvement	THORNDIKE-McCALL READING SCALE FORM 4 AVERAGE T SCORE
	Form A Nov. 1925	Form B May 1926			
1	93.7	114.8		21.1	76.5
2	100.8	108.8		8.0	82.7

TABLE IV

SHOWING THE AVERAGE RATING OF TEACHERS BY THE SUPERVISOR AND TEACHERS

	Group 1	Group 2
Initial—November	72.6	76.6
Final—May	88.8	80.1
Per Cent of Improvement.....	22.3	4.5

TABLE V

SHOWING THE DISTRIBUTION ACCORDING TO CHRONOLOGICAL AGES OF PUPILS

	Group 1	Group 2
Total Number Pupils.....	180	159
Mean Score	184.1	189.6
Standard Deviation.....	16.5	15.9

TABLE VI

SHOWING THE DISTRIBUTION ACCORDING TO T SCORES OF PUPILS THORNDIKE-McCALL SCALE No. 4

	Group 1	Group 2
Total Number Pupils.....	180	159
Mean Score	56.4	55.4
Standard Deviation.....	9.8	7.6

**Summary on the 180 Pupils and 14 Teachers of Group 1 and the
159 Pupils and 15 Teachers of Group 2 who took the
Farm Crops Information Tests A and B and the
Thorndike-McCall Reading Scale, Form 4**

In the Information Tests A and B the 180 pupils in group 1 (the supervised group) made an improvement of 19 points, or 59.2 per cent, as compared with 15.5 points, or 42.1 per cent, the gain made by the 159 pupils of group 2 (the control group). The pupils of group 2 made a score of 36.6 on Form A of the Information Test, as compared with 32.1, the score of the pupils of group 1, while the score for group 1 on Form B was 51.1, as compared with 52.1 for group 2. From these results only it appears that the pupils of group 2 made much less progress than the pupils of group 1, since they started with a much higher score in Form A. When, however, the reliability of the comparative growth between the pupils of group 1 and the pupils of group 2 is checked, the excess gain may be due to chance.

TABLE VII

SHOWING THE RELIABILITY OF THE COMPARATIVE GROWTH BETWEEN
GROUPS 1 AND 2

	GROUP 1 — 180 CASES			GROUP 2 — 159 CASES		
	Form A	Form B	Dif.	Form A	Form B	Dif.
Mean	32.1	51.1	19.0	36.6	52.1	15.5
P. E.....	.636	.948	1.14	.967	1.08	1.45

The reliability of the differences in mean scores may also be significant.

TABLE VIII

SHOWING THE RELIABILITY OF THE DIFFERENCES SHOWN IN MEAN SCORES
BETWEEN GROUP 1 AND GROUP 2

	FORM A			FORM B		
	Group 1 (180 Cases)	Group 2 (159 Cases)	Dif.	Group 1 (180 Cases)	Group 2 (159 Cases)	Dif.
Mean Score	32.1	36.6	4.5	51.1	52.1	1.
Standard Deviation	12.65	18.07	.....	18.85	20.15	.....
Probable Error.....	.636	.967	1.16	.948	1.08	1.44

The probable error of the difference between the scores for the two groups on Form A is 3.9 times the difference, and hence is just on the border line of showing a significant superiority for group 2.

However, on Form B, group 1 showed sufficient progress to reduce the initial difference from 4.5 to 1.0, with a P. E. of 1.44. Hence, the supervision may be credited with reducing a fairly significant difference at the beginning of to an altogether unreliable difference at the end of the period of supervision. The change in the variability of the scores for group 1 from a Probable Error of .636 on Form A to a Probable Error of .948 on Form B also indicates a more efficient learning situation in group 1 than in group 2, where the variability, although greater, remained more nearly constant.

The more capable students are expected to make the more progress. If the efficient teacher keeps each pupil working at his individual optimum rate, the final scores should show greater variability than the initial scores. Of the 180 group 1 pupils, but 26, or 14.4 per cent, failed to show improvement between the initial and final test, as compared with 32, or 18.8 per cent, of the 159 pupils of group 2. At the other extreme, 23, or 12.8 per cent, of the 180 pupils of group 1 made a gain of over 40 points, while this is true of only 13, or 8.2 per cent, of the 159 pupils in group 2.

In Form A, group 2 showed a greater range in scores than did group 1. In Form B, the variation was similar in the two groups. (See Exhibit H* for details relative to reliability and validity of and norms for the test.)

On the Thorndike-McCall Scale, the difference between the T score made by the two groups was 1 point, the T score for group 1 being 56.4, as compared with 55.4 for group 2. The average pupil of group 2 was 5.5 months older than the average pupil in group 1. This may have been due to the fact that 32 of the pupils of group 2 were from Allegany and Washington Counties, two of the three counties of Maryland requiring the completion of 8 grades by pupils before entering high school.

The average chronological age for the 32 pupils from these two counties was 196 months, as compared with 189.6 for all pupils of group 2 and 184.1 for all pupils of group 1.** All pupils of group 1 were from counties requiring the completion of but 7 grades by pupils before entering high school. (See Exhibit I* for distribution according to chronological age.)* The Thorn-

* For statement relative to availability of Exhibit, see page 4.

** The average T score for this group of pupils was 57.3 as compared with 55.4 for the entire group 2.

dike-McCall Scale was used because of its high correlation with general intelligence. The results obtained may indicate a slightly superior mental ability on the part of the pupils of group 1. They indicate that the pupils of group 1 could get information from the printed page slightly more readily than the pupils of group 2. (See Exhibit I for details.)*

The average T score of teachers in group 1 was 6.2 points lower than for the teachers of group 2. The average score in Form A of the Information Test was also lower for group 1 (94) than for group 2 (101). The average rating of the supervisor and teachers in November was slightly higher for group 2 than for group 1. On the other hand, the average per cent of improvement between Forms A and B of the Information Tests was 21 points, or 22.5 per cent, for teachers of group 1, as against only 8 points, or 7.9 per cent, for the teachers of group 2. Also, the per cent of improvement in ratings between November and May was 22.3 per cent for group 1 and only 4.5 per cent for group 2. The teachers and pupils in group 1 evidently applied themselves more effectively, making much more improvement in the Information Tests than did either the teachers or pupils of group 2. The improvement scores for teachers and pupils of group 2 sustain each other. It would seem that there is a mutual relation between growth in teachers and growth in pupils (See Exhibit I for details.)*

It is probable, therefore, that the advantage of 3.5 points or 17.1 per cent for pupils, and 13 points or 14.6 per cent for teachers, which group 1 has over group 2 in per cent of improvement between Form A and Form B, may be attributed largely to the stimulus of a supervision that aims directly at pupil progress and that through conscious understanding of pupil progress achieves teacher growth.

When, however, the reliability of the differences between the improvement of pupils of group 1 and the improvement of pupils of group 2 is checked, the excess gain for pupils of group 1 may be due to chance and not necessarily to supervision.

TABLE IX

SHOWING THE RELIABILITY OF THE DIFFERENCES BETWEEN THE IMPROVEMENT OF PUPILS OF GROUP 1 AND THE IMPROVEMENT OF PUPILS OF GROUP 2

	Improvement in Scores of Pupils of Group 1	Improvement in Scores of Pupils of Group 2	Differences in Improvement in Pupils of Group 1 Over Group 2
Mean	19.0	15.5	3.5
P. E.	.917	.931	1.31

* For statement relative to availability of Exhibit, see page 4.

As is indicated by Table IX, the excess gain of the pupils of group 1 over the pupils of group 2, viz., 3.5 points, is not significant, since the P. E. of the difference between the improvement of the pupils of group 1 over the pupils of group 2 is 1.31. A difference, in order to be significant, must be four or more times the P. E. (See Holzinger, *Statistical Methods for Students of Education*, pages 233-236.)

The pupils of the supervised group apparently made greater progress than did the pupils of the control group. In the initial test, the pupils in the supervised group made scores much lower than did the pupils of the control group, while in the final test, the scores of pupils in the two groups were approximately the same. Supervision may perhaps be credited with reducing a fairly significant difference in the groups at the beginning to an altogether *unreliable* difference at the end of the period of supervision. The greater gain shown by the pupils of the supervised group over the pupils of the control group may, however, be due to chance difference, since the excess gain for the pupils of the supervised group is not sufficiently large to be significant. Had the experiment been conducted over a period of nine, instead of three months, greater improvement in the supervised group probably may have been shown.

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CHAPTER VI

SUMMARY AND CONCLUSIONS

The Objectives of the Study

The study was made for the purpose of securing a basis for justifying Vocational Education in a system of Education; ascertaining the place of Vocational Education in a system of public school education; determining the kinds of Vocational Education especially adapted to the Counties of Maryland; finding the factors involved in the administration of a county system of Vocational Education; deciding upon the type of program to be followed to the best advantage by agricultural teachers; ascertaining the most effective method of organizing teaching content; and for determining the type of supervision of vocational agriculture best adapted to the county high schools of Maryland.

The Development of the Study and Results

In Chapter I the justification of Vocational Education in a system of education has been based on the rapid growth of Vocational Education in the United States; the changing attitude of leading educators in favor of Vocational Education; the specific place of Vocational Education in a system of education; and the necessity for including vocational instruction as one of the principal objectives in the modern secondary school. For the above reasons Vocational Education is necessary in Maryland's high school program.

In Chapter II the most important factors involved in the administration of a county system of Vocational Education have been analyzed. It has been shown that Vocational Education is adapted to the existing curriculums of Maryland high schools; that the agricultural and home economics education are the types of Vocational Education best adapted to Maryland conditions, since the needs and interests of pupils in the rural high schools of Maryland are along agricultural and home-making lines, and that only teachers who have had actual contact with the farm or farm home, in addition to specific college training, including methods of teaching, in the respective fields, should be employed.

In Chapter III, it has been shown that the program of each agricultural teacher should be based on a local farm enterprise survey; and that such a program should include provisions for

the organizing and conducting of all-day, part-time, and evening classes. Samples of programs of work, including proposed methods for classroom instruction in the different types of classes, and typical supervised field and school activities have been set up.

The need for definite goals which will develop right appreciations, attitudes, skills and habits, and afford opportunity for the application of knowledge gained through vocational experience and personal performance has been set forth in Chapter IV. Modern methods of organizing teaching content have been demonstrated; goals, with activities through which they may be achieved, and evidences of achievement, have been set up for each of 22 farm enterprises. The activities through which it is expected that the goals as set up for each enterprise may be achieved were selected with the idea of enabling each pupil to participate to the fullest extent possible. It has been suggested that each activity be presented through a preliminary study, during which the pupil is prepared for a more detailed study, resulting in an analysis of the enterprise into the principal jobs, which gives him an idea as to the scope of the enterprise. The subject-matter content has been organized on the basis of setting up particular jobs for study. The subject-matter content has also been organized in a logical order, with specific references and equipment listed. Lists of references for more extensive reading on the part of pupils especially interested have been provided. Typical supervised practical work, correlating closely with the teaching content, has been outlined; correlated individual and group activities have been provided, as has also correlated farm shop work. Provision has also been made whereby agriculture may be correlated with other high school subjects.

Chapter V deals with supervision as a means of increasing the efficiency of instruction in Vocational Education in agriculture. The outstanding characteristics of effective supervision, namely, a realization that the teacher and pupil should share alike the responsibility for such work as the setting up of definite goals of achievement; finding the conditions affecting learning for the individual pupils enrolled; deciding upon the teaching content; selecting of materials and methods necessary for effective instruction and providing the type of instruction that will tend to educate each pupil up to capacity, have been demonstrated in Chapters I-IV.

That the responsibility for the setting up of definite goals for each of the 22 farm enterprises has been shared by teachers and supervisor is evidenced by the fact that the goals for each unit of subject-matter have been agreed to by the combined membership of all committees of teachers and the supervisor. The finding

of conditions affecting learning for individual pupils enrolled was accomplished through the making of local agricultural surveys and the giving of standard tests by teachers, under the direction of the supervisor. That the teachers and supervisor also shared alike the responsibility for the deciding upon the teaching content, the selecting of the materials and methods necessary for effective instruction, and the providing of the type of instruction that will tend to educate each pupil up to capacity, will be seen by a brief examination of the contents of Chapter IV.

One principle upon which the improvement of teachers in service is based is getting them to feel the need for improvement. That the teachers assisting in this study did feel the need for improvement has been evidenced by the manner in which they cooperated with the supervisor in the securing of a sound basis for evaluating the efficiency of instruction. Twenty-five of the twenty-nine teachers of Vocational Agriculture in Maryland at the time the study was begun assisted in the preparation of the basis adopted as a means of evaluating the efficiency of instruction. Then, too, the willingness on the part of the teachers in the experimental group to prepare daily lesson plans, attend improvement conferences, and give the three standard tests to their respective pupils is also indicative of the attitude of teachers toward improvement. The low self-ratings given by teachers when scoring their own particular situations is indicative of the low estimate teachers were placing upon the condition of classrooms, classroom procedure, and results being obtained.

The purely experimental part of the study was made for the purpose of securing data for a comparison of improvements made by the pupils of the supervised, as compared with the improvements made by pupils of the unsupervised group of teachers. The average improvement of the supervised group was 19.0; of the unsupervised group, 15.5. The difference in gain may be due to chance, since it is but 2.67 times its probable error. It is felt, however, that greater improvement in the supervised group could probably have been shown had the experiment been conducted over a period of nine instead of three months.

The teachers and pupils in the supervised group evidently applied themselves more effectively than did the teachers and pupils of the unsupervised group. It is possible that the more effective application on the part of teachers and pupils in the supervised group may be attributed largely to the stimulus of a supervision that aims directly at pupil progress.

The writer is of the opinion that the making of this study has been very much worthwhile, since it has enabled him to justify the inclusion of and to ascertain the place of Vocational Educa-

tion in a system of public school education; determine the kinds of Vocational Education especially adapted to the Counties of Maryland; find the factors involved in the administration of a county system of Vocational Education; decide upon the type of program which may be followed to the best advantage by agricultural teachers; ascertain the most effective method of organizing teaching content; determine the type of supervision of vocational agriculture best adapted to the county high schools of Maryland; and to provide a basis for evaluating the efficiency of instruction in vocational agriculture.

It is also felt that the making of this study should be productive of outstanding results in that the writer, as a supervisor, has been and will, in the future, be able to share with agricultural teachers responsibility for such work as the setting up of definite goals for achievement, the finding of conditions affecting learning for the individual pupils enrolled, the deciding upon teaching content, the selection of materials, and the following of such methods of instruction as will aid most effectively in educating each pupil enrolled up to capacity.

VITA

Jefferson D. Blackwell, son of Aquilla and Dollie Blackwell, was born at Blackwell, Missouri, September 5, 1885.

He attended public school at Moontown in Jefferson County, Missouri, 1891-1903, Missouri State Teachers' College, Cape Girardeau, Missouri, during summer sessions of 1907, 1908, 1909, 1910 and regular sessions of 1908-1909 and 1909-1910, receiving B. Pd. in 1910; University of Missouri, Columbia, Missouri, during regular and summer sessions of 1912-14, receiving B. S. degree; University of Chicago, Chicago, Illinois, summer of 1915; George Washington University, Washington, D. C., summer of 1917; graduate classes, University of Texas, 1917-1918 and 1918-1919; Teachers' College, Columbia University, New York City, summers of 1920, 1921, 1922, and 1923, receiving A. M. degree; graduate classes, Johns Hopkins University, 1923-1929.

He taught rural school at Halifax, St. Francois County, Missouri, 1906-1907; elementary school, Bonne Terre, St. Francois County, Missouri, 1907-1908; was superintendent of schools at Blodgett, Scott County, Missouri, 1910-1912; Associate professor of agricultural education, Texas Agricultural and Mechanical College, 1914-1917; Specialist in agricultural education, U. S. Department of Agriculture, Washington, D. C., summer, 1917; State Director of Agricultural Education for Texas, 1917-1920; Regional Agent for Agricultural Education, Federal Board for Vocational Education, Washington, D. C., summer, 1920; Assistant State Director of Vocational Education for Pennsylvania, 1920-1923; and State Director of Vocational Education for Maryland, 1923-1929.

He is a member of Alpha Zeta and Acacia Fraternities, University of Missouri, and Phi Delta Kappa, Columbia University

He married Miss Salome Love on August 1, 1915.

He is the father of three children—Edith Lucile, Harold Richard and David Jefferson.

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